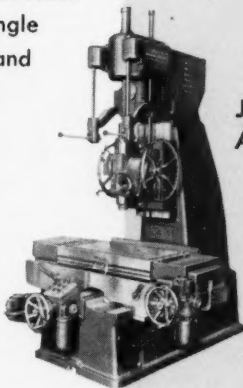


# MODERN Machine Shop

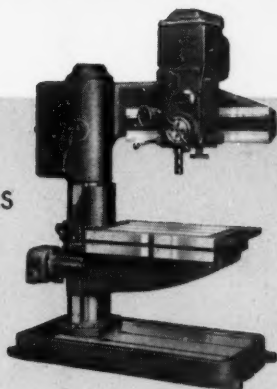
SEPTEMBER, 1952

## FOSDICK

The Fosdick line also includes sensitive drills with single or multiple spindles, and heavy-duty upright drills. Write today for Bulletin FLS.



SENSITIVE  
RADIAL DRILLS



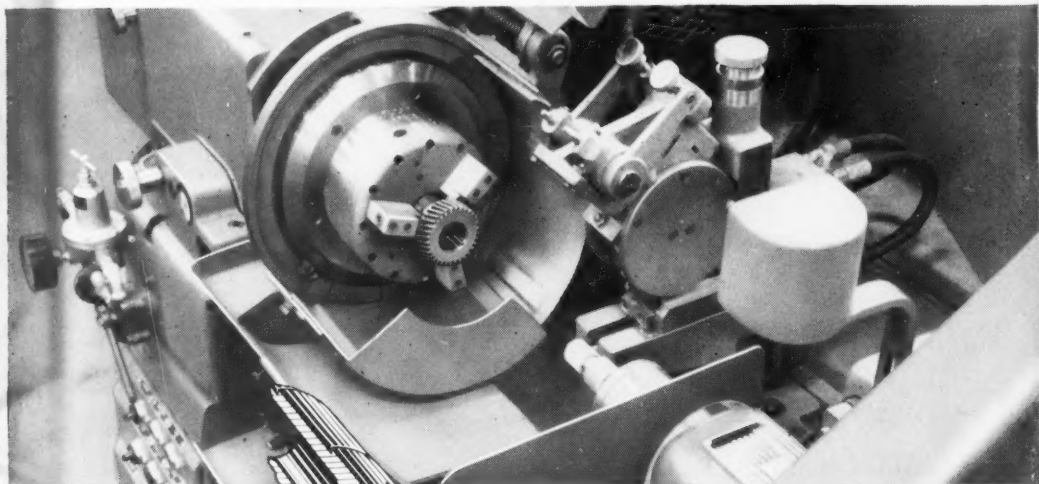
JIG BORERS  
AUTOMATIC POSITIONING MACHINES



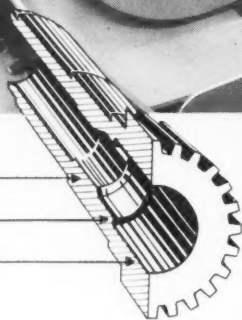
HYDRAULIC  
RADIAL DRILLS

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

**Here's How Heald**  
**multiplied production by**  
**making one head do multiple duty**



1. GRIND BORE
2. GRIND FACE
3. GRIND BORE



***Double wheel spindle  
grinds 3 surfaces  
at the same time***

● When one machine can be equipped to perform several different operations at once, there's a big saving in time and effort — and lower cost per part, too. The Heald Model 271 Size-Matic Internal Grinder above shows how this time-saving multiplicity of operations was applied to the finishing of transmission drive sleeves.

The two different size bores and a shoulder are ground simultaneously by a double-wheel spindle,

in the following high-speed automatic cycle: The table is run in and positioned by a positive stop, with spindle and wheels in the proper location for grinding. The wheel-head then cross feeds into the work, plunge grinding the bores and bottom face. Cross slide then backs off, wheels are dressed, and table runs back in for short reciprocating finish stroke in the bore.

Remember — when it comes to precision finishing, it pays to come to Heald.



*Heald machines speed  
the nation's production*

**THE HEALD MACHINE COMPANY**

**WORCESTER 6, MASSACHUSETTS**

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

VOLUME 25      NUMBER 4  
SEPTEMBER, 1952

*editor*

Fred W. Vogel

*editor emeritus*

Howard Campbell

*associate editor*

Robert I. Shore

*contributing editor*

Gilbert C. Close

*advertising manager*

Gene J. Schwarber

*art director*

Norman S. Rogers

*circulation manager*

K. M. Gettelman

ADVERTISING REPRESENTATIVES

Richard S. Kline

George E. Hay

431 Main St., Cincinnati 2  
Main 0182

G. M. Fillmore

Duncan W. Barton

342 Madison Ave., New York 17  
Murray Hill 7-7390

John M. Krings

Tribune Tower, Chicago 11  
DElaware 7-5441

The Robert W. Walker Co.

2330 West Third Street

Los Angeles 5

DUnklirk 7-4388

57 Post St., San Francisco 4

SUtter 1-5568

Published monthly and  
copyrighted (1952) by

Gardner Publications, Inc.  
431 Main St., Cincinnati 2, Ohio

Printed in U. S. A.

Acceptance under  
Section 34.64, F. L. & R.,  
Authorized

Member



# MODERN Machine Shop

## contents

Over the Editor's Desk .....	120
Features in This Issue .....	123
Pre-Planned Production Pays Dividends .....	124
By Gilbert C. Close	
Improved Jigs and Fixtures for Less Money .....	130
By Frank Charity	
Timely Tips on Machining Stainless Steels .....	136
By George J. Stevens	
Cutting Costs by Practical Dimensioning .....	142
By E. C. Helmke	
More Production Through Better Understanding of Machinability .....	158
By K. R. Blake	
Interpreting Business Legislation .....	192
By Robley D. Stevens	
Chuckling Fixture for Contoured Workpieces .....	216
By W. M. Halliday	
The Low Down on Air Gaging .....	230
By C. W. Kennedy	
Guest Editorial .....	336
By Benjamin F. Fairless	

### Modern Equipment at Work

—Sentry Furnaces Afford Jarvis Increased Production .....	258
—Machining Aluminum Motor Housings for Abrasive Cut-Off Machines .....	259
—Carbide Shearing Die Inserts Trim Six Surfaces on Steel Casting .....	262
—Carbon Restoration of Screw Stock Results in Production Economies .....	266
—Metal Core-Slotting Time Greatly Reduced with Carbide-Tipped Saw .....	270
—Monel Tugboat Shaft Salvaged by Metallizing .....	272
—R.C.A. Assembly Problem Solved with "Junior" Powrarm and Custom-Built Fixture .....	274
—Turning Time for Cast Iron Drier Rolls Reduced by Use of Carbide Tooling .....	278

### Ideas From Readers

—Emergency Boring and Tapping Fixture for Job Work .....	282
By John E. Hyler	
—Fixture for Riveting a Thin Washer to Small Diameter Rod .....	284
By W. M. Halliday	
—Concentric Chamfering of Tubes with Minimum Loss of Time .....	292
By John Rogers	
—Rubber Strips on Vise Jaws Prevent Marring of Delicate Work .....	296
By Irwin Mansfield	
—Tool for Forming Ball Joint Halves with Ball Reamer .....	296
By William Neidhardt	

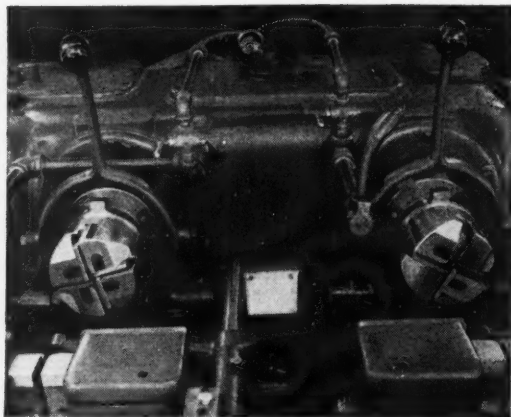
### Departments

News of the Industry .....	300
New Shop Equipment .....	346
Services Directory .....	430
"Where to Get It" .....	432
Editorial .....	442
Index to Advertisements .....	444

# HOLLOW MILLING

## Extra LANDIS Feature . . .

LANDIS Die Heads, in addition to conventional threading operations, can be equipped with LANDIS Turning Cutters which will perform turning, grooving, forming, and facing by the hollow milling method. Milling operations may be performed by LANDIS Heads applied to automatic screw machines, turret lathes, or LANDIS leadscrew-type or hydraulic-feed threading machines, and other positive-feed-type machines.



### Many Production Advantages

Hollow milling by this method offers an increased efficiency occasioned by the application of a multiple number of cutting tools. The feed rate is thus approximately equal to that of a single tool, multiplied by the number of simultaneously-functioning cutters in the unit—four or six for LANDIS Heads.

The LANDMACO Double Head Leadscrew Threading Machine affords a particularly efficient hollow milling method. One carriage will perform the milling operation while the other carriage is being loaded by the operator, thus allowing consistent continuous production. In addition it is entirely practical to perform milling operations on one spindle and conventional threading operations on the other.

### LANDIS Turning Cutters

LANDIS Cutters are economical tools for they are usable for most of their original length. Only the rake angle needs regrinding—a quick and simple procedure. One set of cutters will

machine a wide diametrical range of work, and cutting speeds will range from 30 to 70 linear feet per minute.

Wear and breakage of tools and spoiled work is held to a minimum. The cutting edges of the cutters can be precisely and uniformly located with relation to the center line of the work since they are diametrically-opposed in the cutting position. Thus with cutting strains evenly distributed, the workpiece is never forced out of alignment.

Additional information will be supplied on request—please include specifications.

**LANDIS**  
*Machine*  
**COMPANY**  
WAYNESBORO • PENNSYLVANIA

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

# Hammond

OF KALAMAZOO

*America's Most Complete Line of*  
**ABRASIVE BELT, WHEEL,  
 and CARBIDE TOOL GRINDERS**

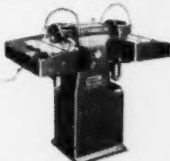
## **POLISHING and BUFFING MACHINERY**

The experience gained in 70 years of designing and building quality machinery is largely responsible for the position Hammond Grinding and Polishing Machinery has today.

In plant after plant where efficiency and reliability of performance is a measuring stick—Hammond Machinery is standard equipment.



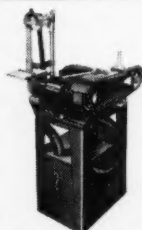
Model CB-77W Wet Chip Breaker and Diamond Finishing Grinder.



WD-10 Wet or Dry Carbide Tool Grinder with double cup wheels. (Also available with a straight and a cup wheel).



Model VRO DIAL CONTROLLED Variable Speed (1500 to 3000 RPM) Polishing Lathe with Model 3-A (air-tensioned) Backstands.



Model 50-DD Abrasive Belt Grinder-Polisher Combination with built-in Duskolector. (10 other models to choose from).



Model CYO Cyclone Duskolector. (Filter models also available).



Model ND-12 12" No-Dust Grinder with built-in Duskolector. (Available for 10" and 14" wheels also).



*Hammond Machinery Builders*  
 INC.

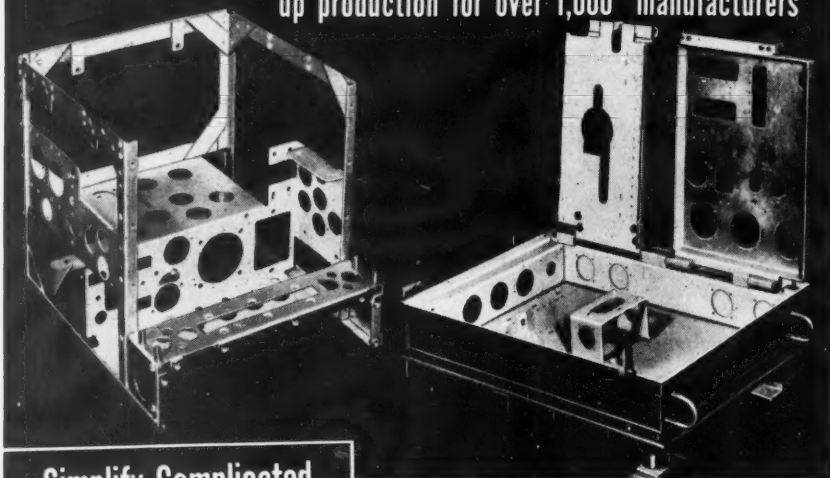
1615 DOUGLAS AVENUE

KALAMAZOO, MICHIGAN

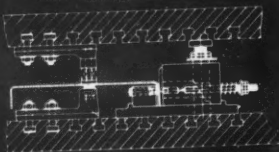
September, 1952

MODERN MACHINE SHOP 3

Whistler Adjustable and Magnetic Perforating Dies are stepping up production for over 1,000 manufacturers



## Simplify Complicated Piercing Operations



Use this HU-50 90° Perforating Unit on the same job with other Whistler Dies... often saves extra press operations.

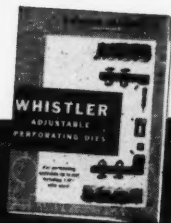
**U**SE WHISTLER Adjustable and Magnetic Dies for perforating, notching and slotting sheet metals...fast, accurate and cost cutting. Complicated patterns can be set up quickly. Hole arrangements can be changed in the press...without waiting and at no extra die cost. New HU-50 units, that pierce at 90° angle, can be used in conjunction with standard perforating equipment. Fewer press operations are necessary.

Re-use the same dies in different arrangements on many jobs. Punches and dies are interchangeable.

Whistler Adjustable Dies can be used in practically every type press. Standard sizes and shapes of punches and dies available up to 3 inches. Special sizes and shapes to order.

## S. B. WHISTLER & SONS, Inc.

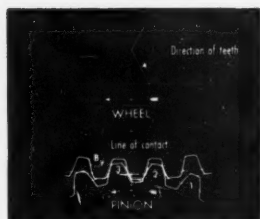
740 Military Road  
Buffalo 23, New York



For prices and application data on this modern way to speed production and cut unit costs, write for these illustrated Whistler catalogs.



The quiet, vibration-free performance of Farrel herringbone gears is the result of extreme accuracy of tooth spacing, contour and helix angle, and other qualities inherent in the Farrel-Sykes method of gear generation. Why these gears continue to operate so quietly, after many years of service, is shown by the diagram illustrating the nature of the contact between a pair of Farrel gears.



The lines of contact are oblique across the face of the teeth, and the pressure is evenly distributed over each tooth, from tip to working depth line. This means that there is no tendency for the contour of the teeth to wear unevenly.

Farrel herringbone gears are made of the finest grade materials, in a complete range of sizes from  $\frac{1}{4}$  inch to 20 feet in diameter. Write for further information or for engineering assistance.

**FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.**

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.

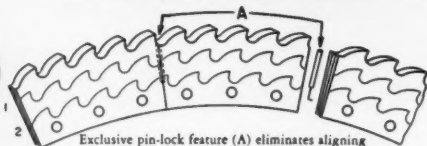
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Detroit, Chicago, Minneapolis, Portland (Oregon), Los Angeles, Salt Lake City, Tulsa, Houston, New Orleans

FB-744

# NEW

... for metal cutting

The Disston Chromos\*  
Segmental Circular Saw



Exclusive pin-lock feature (A) eliminates aligning rivets generally used in segmental saws. Saws with aligning rivets can only be sharpened down to line 1. Disston Chromos can be sharpened down to line 2, giving up to 30% more cutting life.



**with up to 30% longer cutting life from each set of segments!**

- Replaceable high-speed steel segments
- Tough alloy steel body
- Exclusive pin-lock feature
- For ferrous or non-ferrous metals
- In diameters from 11" to 63"

Here's the latest development in segmental circular saws for sawing ferrous and non-ferrous metals. Unlike any other segmental saw, in which segments are joined by rivets, the segments on the Disston Chromos are *locked* together by flexible tightening pins—permanently holding the segments in perfect alignment. This patented design makes possible up to 30% more cutting life because there are no aligning rivets to limit sharpening.

The tooth segments, of high-speed steel, need only infrequent sharpening. Their narrow kerf assures fast, clean cutting with minimum waste. *Segments are*

*quickly replaced and automatically aligned because of the pin-lock feature.* Set after set of segments—each with up to 30% extra life—can be fitted to the non-wearing saw body. The tough steel saw-body of the Disston Chromos will accept the strains and shocks of production cutting. Teeth are accurately indexed so they may be sharpened on automatic machines.

**SEE YOUR  
DISSTON  
DISTRIBUTOR**

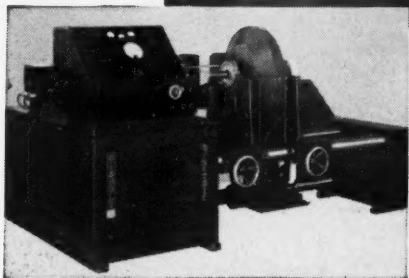
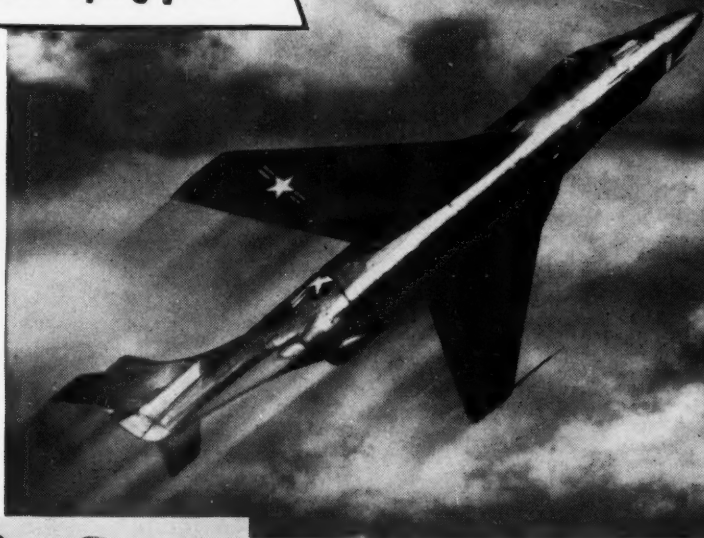


**HENRY DISSTON & SONS, INC.** 921 Tacony, Philadelphia 35, Pa., U.S.A.

Branches: Chicago, Seattle, Portland (Ore.), Vancouver (B.C.)  
Factories: Toronto, Ont., Canada; Sydney, N.S.W., Australia

\*Alba Record

**Screaming Power  
for the flying jets!**



## Smoothed by GISHOLT BALANCING

Heart of the jet propulsion engine is the high speed impeller (air compression member) which rotates at speeds above 15,000 r.p.m. The impeller must be free from any trace of unbalance, for at such speeds, the slightest vibration is disastrous.

Gisholt DYNETRIC Balancing Machines do the job so well that these ultra high speed rotors spin with an off-center displacement of less than .000025"! They make such a quick, easy and accurate job of it that they are used almost universally for this work.

In fact, Gisholt DYNETRIC Balancing can be used to balance anything that rotates—from ½ ounce to 50 tons. Freedom from unbalance vibration means greater safety, less wear, better service—and distinctly longer life.

\*Write for free booklet "Static & Dynamic Balancing."

**DYNETRIC  
BALANCERS**



DEVELOPED JOINTLY WITH  
WESTINGHOUSE ELECTRIC CORPORATION  
"DYNETRIC" IS A TRADE MARK  
REG. U. S. PAT. OFFICE BY  
WESTINGHOUSE ELECTRIC CORPORATION



**THE GISHOLT ROUND TABLE**  
represents the collective experience  
of specialists in the machining, sur-  
face-finishing and balancing of  
round and partly round parts. Your  
problems are welcomed here.

# GISHOLT

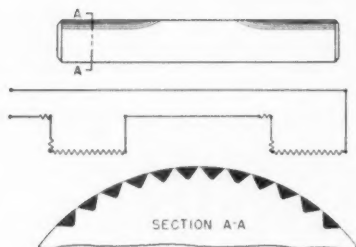
MACHINING COMPANY

Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machine with automatic fixtures for milling the serrations in both ends of brake pedal shafts, at a production rate of 123 per hour.

**completely  
WITH**



Drawing of part and diagram of automatic cycle.

Part name ..... Brake pedal shaft  
Material ..... Steel  
Operation ..... Mill serrations, both ends  
Cutting speed... 110 ft. per minute  
Table feed ..... 12" per minute  
Production ..... 123 per hour  
Equipment ..... CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machines, with automatic fixtures

# automatic setup for automotive part

## DEFENSE APPLICATION POSSIBILITIES



CINCINNATI No. 0-8  
Automatic Rise and  
Fall Milling Ma-  
chine. Catalog No.  
M-1607-1 con-  
tains complete  
specifications.



Costs descend vertically and operators are happy with the automatic equipment illustrated here. It's a CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machine, with a magazine type fixture. All the operator has to do is stack work on a shelf; the machine and fixture take over the job of loading, clamping, milling and ejecting.

¶ In one operation, serrations on both ends of brake pedal shafts are automatically milled with this setup. The machine's hydraulic rise and fall feature is the deciding factor in taking these two milling cuts. After taking the first cut the spindle carrier automatically rises, the table repositions, and then the carrier advances down to accurate depth for the second cut. Production averages 123 shafts per hour. ¶ CINCINNATI No. 0-8 Automatics have many features of value for this type of work, and our Application Engineers have the know-how to tool them up to your requirements. Of course, these machines are in short supply right now, but you might like to know more about them for future applications. Ask for catalog No. M-1607-1.

THE CINCINNATI MILLING MACHINE CO.  
CINCINNATI 9, OHIO

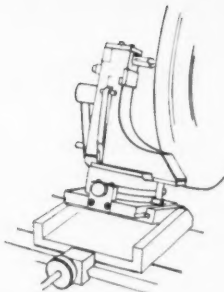
# CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING  
MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES  
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

**.0001" ACCURACY**

## *Fluidmotion* **WHEEL DRESSERS**

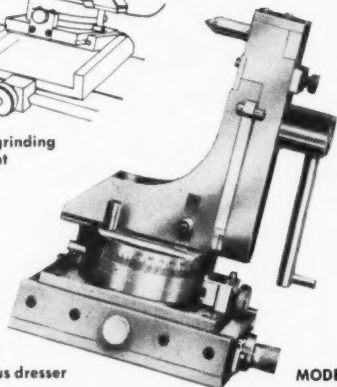
dress two angles tangent to a radius  
in one continuous motion



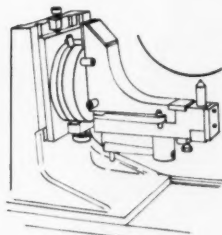
with cylindrical grinding  
attachment



Form-master  
low cost angle or radius dresser



MODEL C  
with the  
micrometer feed



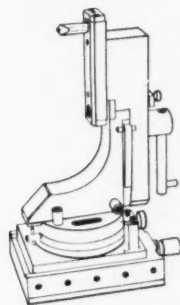
with under wheel attachment

### **ADAPTABLE TO ALL TYPES OF CYLINDRICAL AND SURFACE GRINDERS**

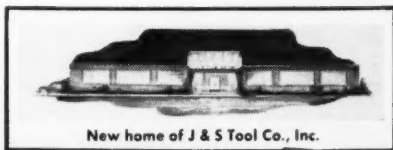
With the unique "Fluidmotion" Dresser, you can dress two angles tangent to a radius—using one handle in one continuous motion. Operation is so fast and simple that beginners can use them to boost your grinding machine out-put. Forms are always clean, precise—angles and radii "flow" into each other. Contours are consistently sharp, accurate to .0001", without tool or chatter marks.

**J & S TOOL CO., INC.**

**475 Main Street, East Orange, N. J.**



Model HC-36  
for wheels up to  
36" diameter



New home of J & S Tool Co., Inc.

**J & S  
TOOL CO. INC.**

A variety of models and attachments to suit your needs. Write for free catalog covering dressers in detail. J & S also manufactures a complete line of All-Purpose Jaw (machine) Clamps, Vises, and Special Tools. Write for Machine Shop "Time Savers" booklet.

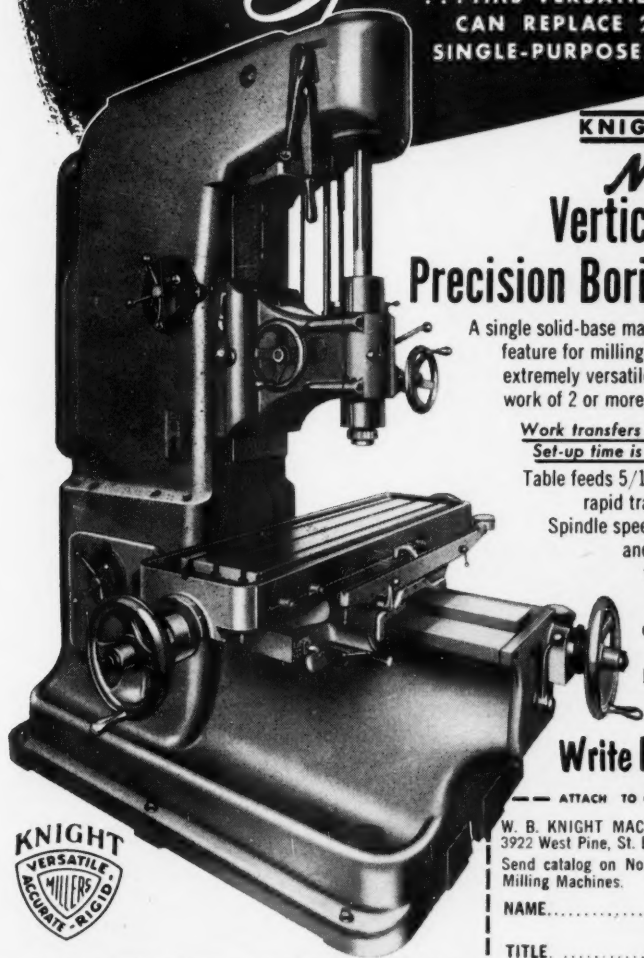
# Precision + Speed + Power

... THIS VERSATILE MACHINE  
CAN REPLACE 2 OR MORE  
SINGLE-PURPOSE MACHINES

KNIGHT'S

## No. 50

### Vertical Milling & Precision Boring Machine



A single solid-base machine with every essential feature for milling and accurate boring—an extremely versatile machine that will do the work of 2 or more single-purpose machines.

Work transfers are entirely eliminated  
Set-up time is reduced to a minimum

Table feeds 5/16" to 20" per minute plus rapid traverse in all directions. 16

Spindle speeds from 40 to 2000 r.p.m. and infinitely variable boring feeds from .005" to .010".

Convenient quick-action controls—full-vision work areas—easy operation. Powerful all-gear 7½ H.P. drive—extra-rugged construction.

### Write For Catalog

ATTACH TO COMPANY LETTERHEAD

W. B. KNIGHT MACHINERY COMPANY  
3922 West Pine, St. Louis 8, Mo.

Send catalog on No. 50 and other Knight Milling Machines.

NAME.....

TITLE.....

☐ Send information on Knight's 20" & 42" Rotary Tables.




**W. B. KNIGHT MACHINERY CO.**  
3922 WEST PINE BOULEVARD • ST. LOUIS 8, MISSOURI

September, 1952

MODERN MACHINE SHOP 11

# millions of parts



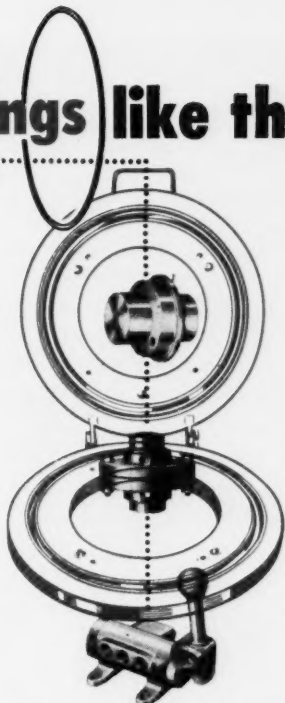
Chatter-free turning, smooth feeds, and rigid construction of this LeBlond 16" Heavy Duty Engine Lathe spell precision plus at Linear Incorporated of Philadelphia. Die orientation is insured by turning and boring mating diameters to .0005" tolerances. Flatness of faces is within .001" and roundness of cavity section is held to .001" of perfect circle. Material: Timken Graphitic MO; tool: high-speed steel.

# are married with rings like these

Industry needs sealing rings to "marry" millions of parts against leakage of air, liquid, and gas. Seals, for example, like the rubber "O" rings made by Linear Incorporated of Philadelphia. They're vital to the successful operation of hydraulic mechanisms, air-operated devices, and chemical processing equipment . . . to name just a few applications. And industry says, "Make these sealing rings to precision tolerance for non-leakage. Deliver the millions we need at low cost."

Linear experimented . . . found that "O" rings with the required finish and roundness could be mass-produced easily enough . . . but to turn them out at low cost demanded virtual elimination of hand-finishing operations. The problem called for dies made to tolerances that would deliver cross-sectional roundness conforming to nearly "perfect circle," mating diameters so accurate that perfect die orientation could be achieved.

Then Linear installed their new 16" LeBlond Heavy Duty Engine Lathe. This profit-building lathe is saving expensive toolroom time and delivering cavity finish on Linear's dies as fine as 10 microinches, mating diameters to the required .0005" whisker of tolerance, cross sectional roundness within .001" of perfect circle. Costly die-finishing time at Linear is down . . . flash-removing second operations on "O" rings are at a bone-bare profit-making minimum. It's a case of chatter-free turning, smooth-as-silk feeds, and rigid construction.



LeBlond features like hardened and ground self-compensating steel bed ways, totally enclosed quick-change box, one-piece apron and a host of others will insure Linear a lifetime of this same smooth-turning performance.

Whether you need unfaltering accuracy or high output rapid production, there's a LeBlond lathe that will fill the bill. Your nearby LeBlond distributor will tell you about our complete line. Call him or write

**THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO**

Ask for Bulletin HD125 E

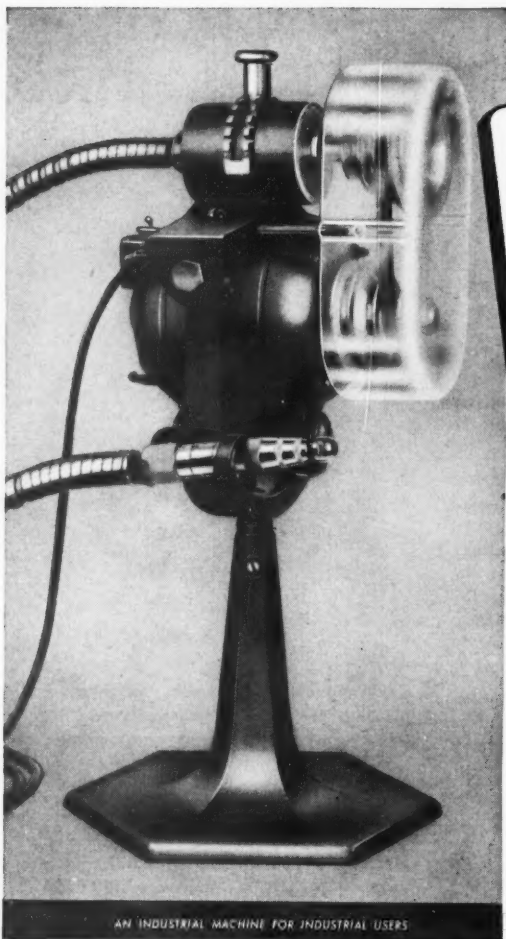
for more information on the 16"

LeBlond Heavy Duty Engine Lathe

**turned faster by**



**WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 64 YEARS**



AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

TAPPING ATTACHMENTS • TAPS • FLEXIBLE SHAFTS  
AND MACHINES • ROTARY FILES • TUNGSTEN CARBIDE  
REAMERS AND MILLS • DRILLS • BORING BITS

**Jarvis POWER TOOLS**

Do Your Jobs  
**EASIER - FASTER**  
with  
**Jarvis**  
**FLEXIBLE  
SHAFT  
MACHINES**

Whether your operations call for GRINDING, CUTTING, BUFFING, or ROTARY FILING, Jarvis Flexible Shaft Machines will do your jobs Easier—Faster and more economically.

Available in Bench, Floor or Overhead types—in Single or Multiple Speeds to suit your individual requirements.

Jarvis Factory trained representatives are ready to assist you select the Machines you need. For further information and Catalog of Jarvis Flexible Shaft Machines, write directly to The Charles L. Jarvis Company, Middletown, Connecticut.

THE CHARLES L. JARVIS CO.  
MIDDLETOWN IN CONNECTICUT

# Jarvis

## SOLID TUNGSTEN CARBIDE TOOLS

INDUSTRIAL TOOLS FOR INDUSTRIAL USERS



P R E C I S I O N   M A C H I N E   G R O U N D

*Quality*

ROTARY FILES • REAMERS • BORING BITS • END MILLS

TAPS • TORQOMATICS  
MULTI-TAPPERS  
FLEXIBLE SHAFT MACHINES

WRITE FOR ILLUSTRATED CATALOG

THE  
CHARLES L. JARVIS  
COMPANY

MIDDLETOWN IN CONNECTICUT

September, 1952

MODERN MACHINE SHOP 15

ONE  
QUICK  
TWIST

and..... you're ready to drill

with an

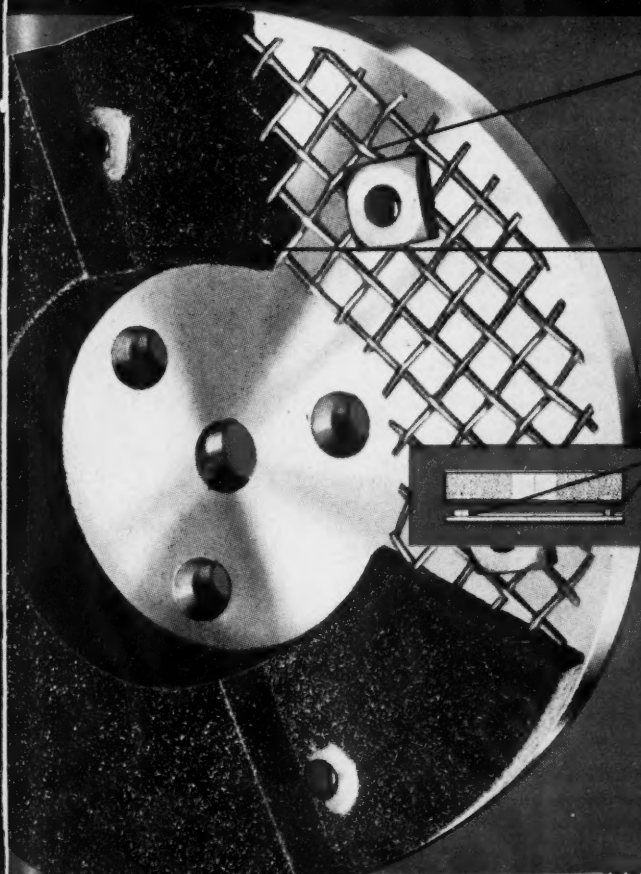
**Ettco-Emrick**  
**KEYLESS**  
**DRILL CHUCK**

• The Ettco-Emrick Keyless Drill Chuck is the nearest thing to completely automatic chucking there is. It's self-tightening and self-centering. All you do is insert the drill between the jaws and give the knurled chuck body a turn. Drilling action does the rest, clamping the jaws on the drill in a powerful, rigid grip that automatically increases with the load. No key is needed. Slipping, retightening and scored shanks are eliminated. There's no better drill chuck buy today.

Sizes in a range of capacities for No. 0 to  $\frac{3}{8}$ " drills. Contact your local Ettco-Emrick distributor for details and prices.

**ETTCO TOOL CO., INC.**  
**594 Johnson Avenue, Brooklyn 37, N. Y.**  
**Worcester, Mass. • Detroit, Mich. • Chicago, Ill.**  
Dealers throughout the United States and Canada

# Compare the Exclusive Features of This Abrasive Disc With Other Makes



**1 WIRE-LOOM CONSTRUCTION**  
for positive safety

Heavy wire mesh is staked as an integral unit with abrasive. Provides maximum protection for operator.

**2 JOB-FITTED ABRASIVES**  
at no extra cost

Abrasives compounded to fit needs when necessary. Production records permit exact duplication for reorders.

**3 TRU-LOK DISC MOUNTING**  
for maximum precision

On GARDNER discs provided with the Tru-Lok feature, off-center mounting is impossible. Doweled Tru-Lok mounting aligns the holes in the abrasive disc and steel wheel exactly.

**4 FIELD ENGINEERING SERVICE**

A nation-wide service organization available to help you solve your flat surface grinding problems. Helps you obtain maximum efficiency and service from abrasive discs and equipment.



# **GARDNER**

*abrasive  
discs*

Publicity Department  
**GARDNER MACHINE COMPANY**

Beloit, Wisconsin

104AS

Please send me a free copy of the Gardner  
Abrasive Disc Guidebook.

NAME

TITLE

COMPANY

ADDRESS

CITY  ZONE  STATE

# Worth Looking Into!

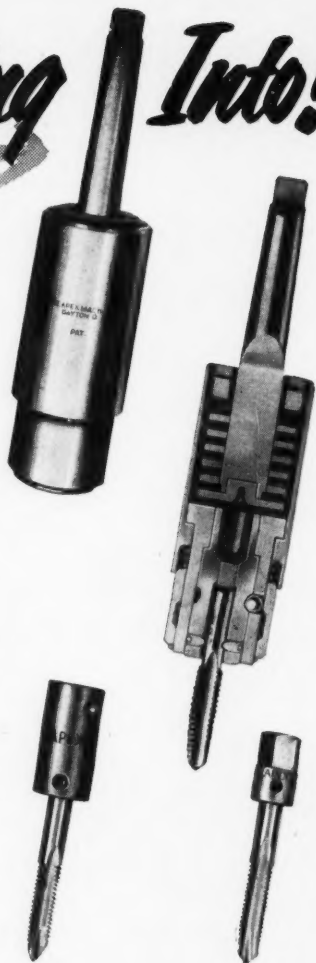
## APEX friction chucks

Wherever the tool is subject to breakage, that's the spot for an Apex Friction Chuck. Merely turn the adjusting nut to secure the proper tension and the friction will slip just before the breaking point of the tool is reached. End thrust from tapping or drilling, or pressure exerted on the spindle will not affect tension setting. Setting maintained for extended periods without requiring readjustment. Safe and simple to operate, Apex Friction Chucks will reduce tool breakage. Used on reversible drill presses, radials, hand screw machines, all makes of tapping devices, and with air or electric tools.

## ...and APEX sockets for tap driving

For re-tapping or cleaning damaged or clogged tapped holes. Set screw holds tap firmly in hex or female square socket. Quickly and easily attached to power tool. Saves time on assembly and production lines by enabling operator to re-tap damaged holes, or clean holes plugged with paint, gunk or similar materials.

Get all the facts about all Apex production tools . . . write, on your company letterhead please, for your copy of the new Catalog 114.



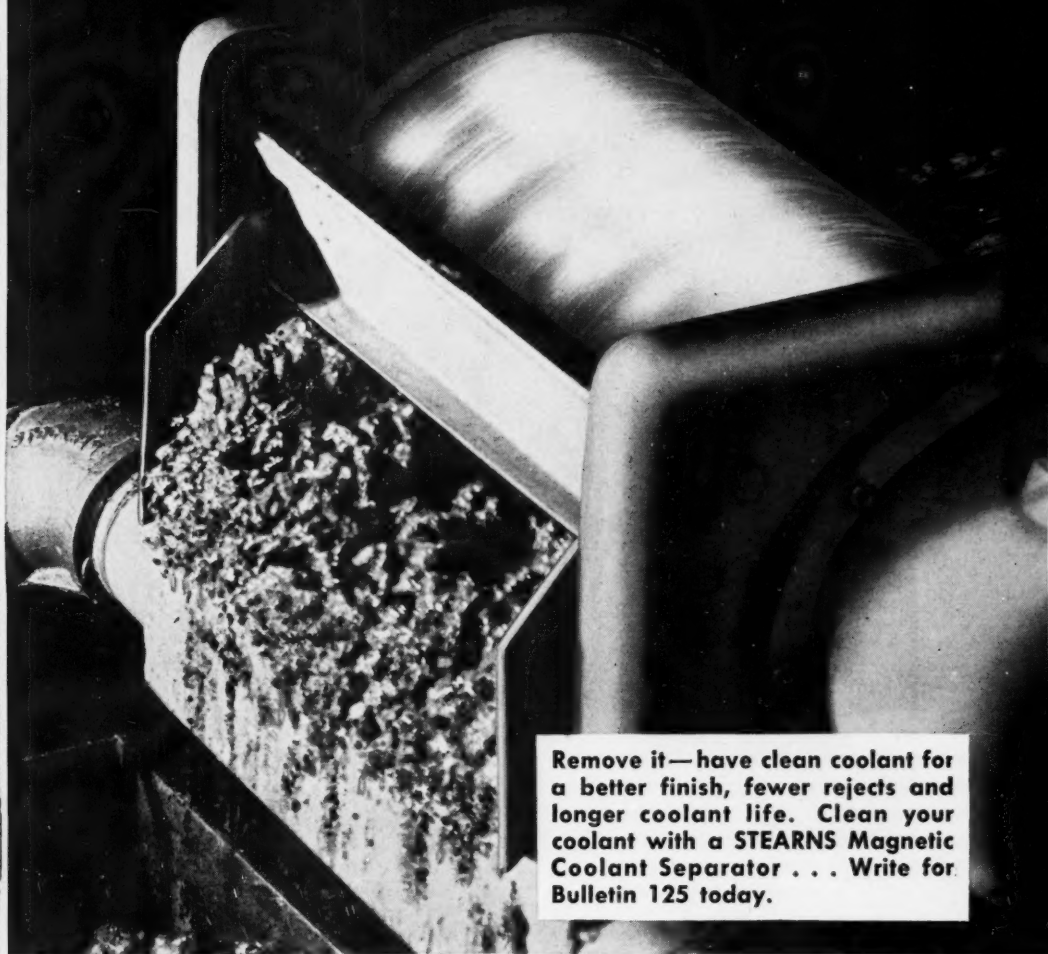
# APEX TOOLS

## production tools

THE APEX MACHINE & TOOL COMPANY  
1027 S. Patterson Blvd., Dayton 2, Ohio

Power Bits, Insert Bits and Bit Holders, for Phillips, Frearson (Reed & Prince), Slotted, Clutch Head and Socket Head Screws • Hand Drivers for Phillips, Frearson and Clutch Head Screws • Two-Piece Drivers for Hex Head Screws • Sockets, Extensions, Adapters and Nut Setters • Universal Sockets, Extension Wrenches and Adapters • Aircraft and Industrial Universal Joints • Self-Releasing and Adjustable Stud Setters • Safety Friction Tapping Chucks • Vertical Float Tapping Chucks.

**Is this sludge  
in your coolant system?**



Remove it—have clean coolant for a better finish, fewer rejects and longer coolant life. Clean your coolant with a STEARNS Magnetic Coolant Separator . . . Write for Bulletin 125 today.



664 SOUTH 28TH STREET

Foremost in the Magnetic Field

**Stearns** **MAGNETIC INC.**

MILWAUKEE 46, WISCONSIN

16852G

"It all adds up to this:  
**MORSE ELECTROLIZED**  
are the least expensive  
tools you can buy!"



The tool-crib boss never loses a chance to remind the works manager that: "Every new shipment of Morse Cutting Tools that comes into the plant *pays another bonus in plus-production!*"

That's right. For what Morse Tools *really* cut are *costs* . . . by cutting cleaner and faster . . . by staying on the job longer. And then, of course, to go even further and get the unmatched maximum in tool-life, *specify* Morse Electrolized Tools.

Whatever you need, in standard or special-purpose tools contact your Morse-Franchised Distributor. He'll work out the exact specifications that will give you top performance *on your particular job*, at lowest cost. He has the know-how and the assistance of Morse Engineers to solve any tooling problem.

**MORSE TWIST DRILL & MACHINE COMPANY**  
NEW BEDFORD, MASS.

(Division of VAN NORMAN CO.)

Warehouses in New York, Chicago, Detroit, Houston, San Francisco

**TOOLS**

POSITIVELY NO ADMITTANCE



**MORSE**

**Cutting Tools**

...buy them by phone from  
your Morse-Franchised  
Distributor and save  
ordering time

what can you  
grind on a

**DIVERSIMATIC ?**

**...more**  
*than you think!*

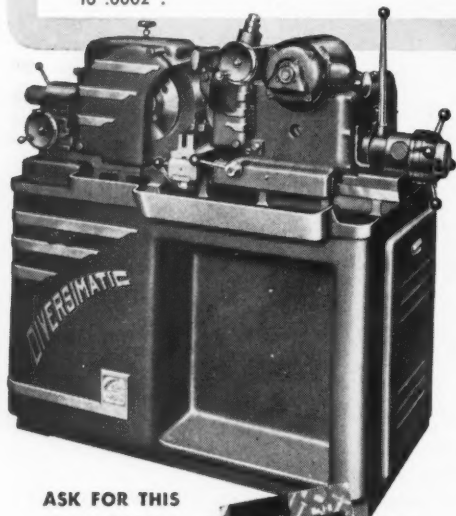


Three concentric diameters on this high carbon steel pin are ground from the solid. Work such as this is frequently held to .0002".



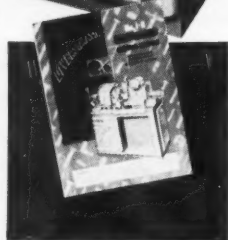
**UNUSUAL CENTERLESS GRINDING JOBS:**

By centerless grinding ends of these A-N fittings, exact amount of stock is retained to roll into a perfectly sized thread.



**ASK FOR THIS  
NEW FOLDER**

6 pages of detailed  
centerless grinder  
information.  
Sent free.



Common opinion is that centerless work is limited to one diameter cylinders alone. Actually, this is a *small fraction* of the work being done on DIVERSIMATICS today! In addition, you can grind OFF-BALANCE OBJECTS, PROFILES DIRECT FROM THE SOLID, MULTIPLE DIAMETERS SIMULTANEOUSLY, UP TO AND INCLUDING SHOULDER FACES, ETC. *The DIVERSIMATIC gives you a new way to get jobs out faster, puts you in a better competitive position, insures precision to "tenths."* Investigate DIVERSIMATIC's possibilities on *your work!*

**ACCESSORIES:**

Full line of INFEEDING, THRU-FEEDING, AUTOMATIC CYCLING.

**DELIVERY:**

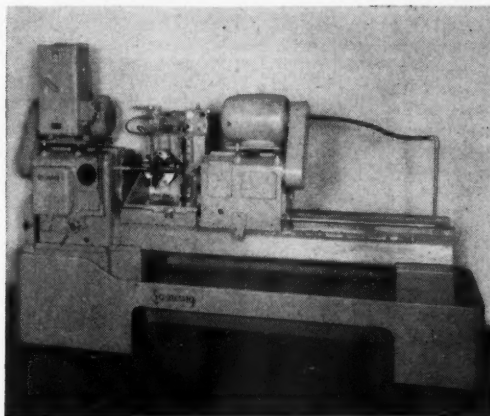
Just 8 weeks away—why wait?

**DIVERSIFIED  
METAL PRODUCTS CO.**

5125 Alcoa Avenue, Los Angeles 58, Calif.

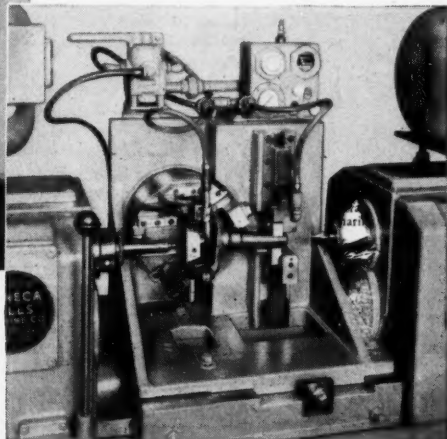
# MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



◀ General view of Model CS Centering Machine equipped for centering front wheel pivots.

▼ Close up view of special work holding fixture.



## MODEL "CS" CENTERING MACHINE CENTERS FRONT WHEEL PIVOTS ACCURATELY, ON HIGH PRODUCTION BASIS

**Problem:** To center both ends of front wheel pivots without distorting the stem end.

**Solution:** The standard Model CS Centering Machine equipped with a special work holding fixture was selected for this job. The work comes to the machine as a rough forging without any previous machining. The work holding fixture consists of a special round chuck mounted on a spindle yet free to revolve a few degrees on each side of the center line. This prevents any bending of the part when the 2-jaw vise closes on its small end. The chuck and vise jaws are operated with separate air cylinders installed on the rear of the fixture and controlled by a 4-way air valve.

The operator places the rough forging in a loading cradle, against a spring-loaded V-block, which positions it in relation to the opening between the lugs at the large end. The air valve is then operated and the large threaded stud, fitted to the inclined air-operated cross slide, forces the part back into the stationary V-blocks. A second movement of the air valve closes the 2-jaw air-operated vise. Starting handle is then positioned forward and the machine goes through its cycle automatically. Both ends are centered simultaneously.

Seneca Falls engineers welcome inquiries involving difficult machining problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

**One complete piece.....**

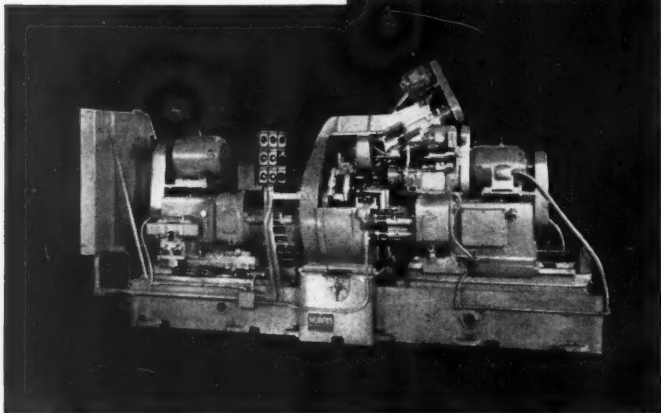
**29 Operations Every 41 Seconds.....**

Producing crankshaft main bearing caps, this MORRIS Two Way, 6-Station Machine performs 29 operations with a single loading. One head carries 14 spindles, the other 12 spindles. Production rating is 87 pieces per hour at 100% efficiency. Operations performed include drilling, reaming, spot-facing and tapping.

This Morris application, for a leading automotive manufacturer, illustrates that "two heads are better than one" for higher production at lower cost. Put your heads together with MORRIS Engineers on any mass production, multiple drilling, reaming, tapping and similar operations. You'll save time, money, labor and floor space.

on this

*Morris*  
**MOR-SPEED  
MACHINE**



**"A Better Product at Less Cost . . . with PRECISION PLUS PRODUCTION"**



**THE MORRIS MACHINE TOOL COMPANY**  
934 HARRIET ST. CINCINNATI 3, OHIO

# Automatic Recessing

## the "Know-How" of grooving

Wherever grooves, faces, chamfers, etc.  
are cut — whether internal or external—  
speed production, reduce costs on long runs

with  **SCULLY-JONES**

### AUTOMATIC RECESSING TOOLS

They do these operations on standard drill presses, radial drills, turret lathes and chucking machines, as well as on special machines. A single recessing tool is easily adapted to do various operations or a combination of operations. Adjustments regulating location and depth of groove are simple, fast and accurate. Types "J" and "C" pilot in a fixture bushing. Type "R" pilots in, and stops on the work.

### TYPICAL RECESSING-TOOL OPERATIONS

Facing An Internal Boss  
On Motor Castings Where  
Obstruction Usually Causes  
Difficulty.

Both Inside And Outside Clearance  
Grooves Cut In One Operation  
On Oil Tank Caps For Submarines.

Groove For Thread Clearance Cut  
On Anti-Aircraft Projectile With  
Automatic "Necking" Tool.

Formed Recesses Made In One  
Operation On Detonator Bushings  
Of Large Calibre Motorized Artil-  
lery Rifles.

Casting Of Part For Army Tank On  
Which Two Recesses Are Made At  
One Time.

Snap-Ring Grooves Cut In Wrist  
Pin Hole Of Airplane Pistons.

R-5496MT

1909 S. ROCKWELL ST., CHICAGO 8, ILLINOIS

**YOU GET LOW COST, FAST, ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS**

September, 1952

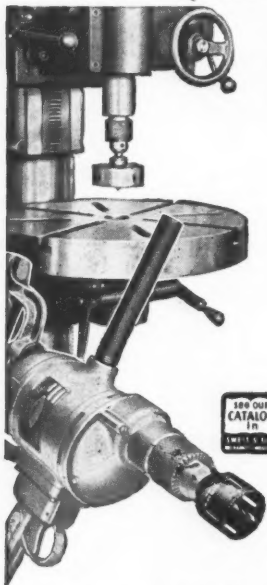
MODERN MACHINE SHOP 25

# Cut... LARGE HOLES

... thru any machineable  
material up to 1 1/8 INCHES thick!



Here is a premium tool which makes it possible to saw holes in one short operation ... large holes which heretofore had to be laboriously machined "a-chip-at-a-time."



MARVEL High-Speed-Edge Hole Saws have strength to withstand the terrific peripheral strains of heavy duty operation in lathes, drill presses or portable power tools. They have a high speed steel cutting edge which is electrically welded to a tough, alloy steel body, high speed steel pilot drills, heavy hexagonal shanked arbors and sufficient set for deep drilling. They are self-aligning, as the larger diameter saws float on their arbors and are driven by double drive pins. They will saw round holes accurately in any machineable material.

MARVEL High Speed-Edge Hole Saws come in 35 sizes, from 3/8" to 4 1/2". They are carried in stock by leading industrial distributors

WRITE FOR BULLETIN ST-650

**"MARVEL" has Always had the edge!**

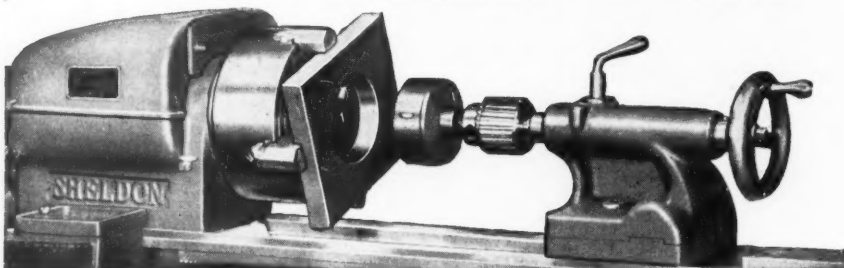


**ARMSTRONG-BLUM MFG. CO.**

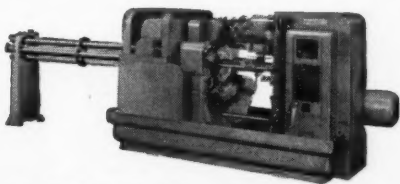
"The Hack Saw People"

5700 Bloomingdale Avenue

Chicago 39, U. S. A.



# No cam worries with a Warner & Swasey 5-Spindle Automatic



5-Spindle Bar Machines

—1 $\frac{3}{4}$ " Standard Capacity

—2 $\frac{1}{4}$ " Oversize Capacity

5-Spindle Chucking Machine—6" Swing



**IT'S SIMPLER TO SET UP A WARNER & SWASEY CAMLESS AUTOMATIC!**



**You can  
BARREL-FINISH  
to BLUEPRINT  
ACCURACY  
with Norton  
ALUNDUM\*  
Tumbling Abrasive**

You get real *precision finishing* with Norton ALUNDUM Tumbling Abrasive. Being all aluminum oxide — not a bonded material — its cutting action is continuous, without glazing. It has the hardness required for fast, positive cutting and the hardness and toughness for long, productive service life.

**SEE YOUR  
NORTON DISTRIBUTOR**

For every barrel-finishing application, on ferrous or non-ferrous metals, for any

type of barrel, there's a grit size of ALUNDUM Tumbling Abrasive that will give you exactly the results you want. Your Norton Distributor can supply you promptly — and he'll gladly call in a Norton Abrasive Engineer to study your finishing operations and make specific recommendations.

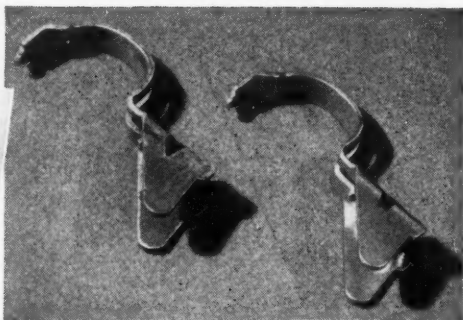
**NORTON COMPANY  
Worcester 6, Mass.**

Distributors In All Principal Cities

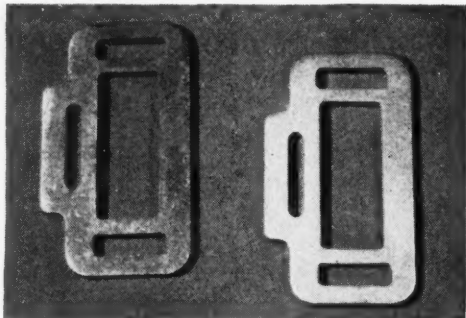
Export:

Norton Behr-Manning Overseas Inc.  
Worcester 6, Mass.

\*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries



**REMOVING HEAT-TREAT SCALE** and deburring the hard-to-get-at areas on these steel trigger guards with ALUNDUM Tumbling Abrasive helped speed up the finishing of these defense items.



**DEBURRING** these parachute buckles — particularly the inner surfaces — is a good example of how barrel-finishing with ALUNDUM Tumbling Abrasive can solve a tough finishing job.

**Free Handbook**

55 illustrated pages describing every detail of barrel-finishing. Ask your Norton Distributor or write us direct for your copy of Form 501.

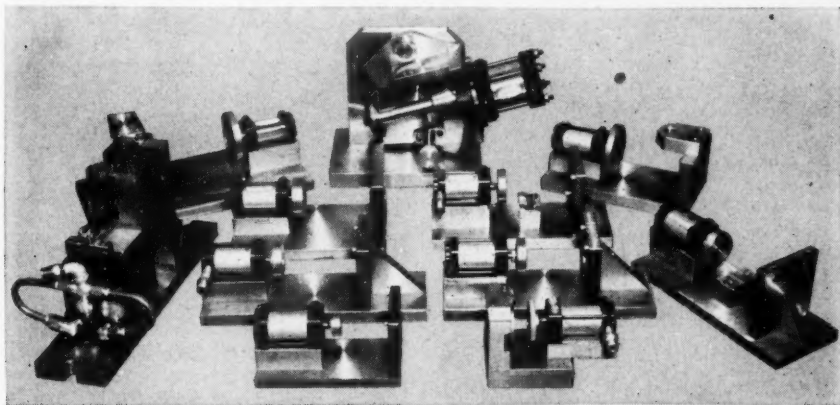


**NORTON**

**ABRASIVES**

*Making better products to make  
other products better*

# INEXPENSIVE AIR CLAMPS REDUCE FIXTURE LOADING—UNLOADING TIME



A machine tool makes money only when it's cutting metal. Every second it stands idle while a fixture is being loaded or unloaded cuts into the profit picture.

Romec Pump Division, of Lear, Inc. has increased production 265% to 500% in more than 75 machining operations by using Bellows Han-d-Air cylinders to open and close fixtures and other workholding devices.

This midget air cylinder develops 100 lbs. of pressure at

100 lbs. of air. Its 1" stroke is ample for most clamping operations. Its overall size 4" x 1½" square, saves space. A threaded 5/16" piston rod simplifies installation.

The Han-d-Air can be mounted in any position, and is even equipped with provision for pivot mounting. Its cost is so low (only \$6.00 each or \$66.00 per dozen) it is less expensive to leave it permanently on the fixture than to switch it from one fixture to another.

609A

**ORDER . . . .  
A TRIAL DOZEN  
. . . . TODAY**

Write Dep't MMS-952,  
The Bellows Co.,  
Akron 9, Ohio

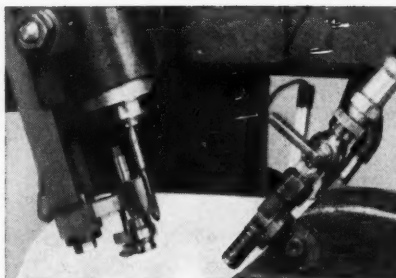
The  
**Bellows**  
Co.  
AKRON, OHIO

# At Last! A Way To Get Uniform Rake Angles On All Taps

The difficulty of regrounding a once-accurate tap to its original rake angle is often responsible for low production per tap and excessively high tap costs. Grinding other taps to the same uniform rake angle has also presented a problem.

## A METHOD OF PRECISION SHARPENING

There is, however, one method of sharpening both old and new taps precisely to provide one uniform rake angle—the one which is desired. These excellent sharpening results can be obtained by regularly using the Blake Flute Grinder and the Blake Chamfer Grinder for all your taps. These are the only two machines on the market today that enable you to grind your taps to such true-cutting accuracy. With Blake equipment you can sharpen each tap precisely to provide not only for uniform rake angles on each cutting edge, but also for uniform spacing of cutting edges and accurate chamfers. The Blake method of precision sharpening results in much longer tap life, greatly reduced tap costs, and more accurate finished work.



THE HEART OF PRECISION SHARPENING

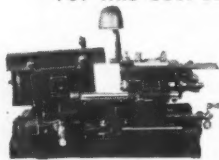
Photograph shows close-up of tap positioning mechanism of the Blake Flute Grinder.

## READ THE FACTS NOW!

For a detailed explanation of the benefits of precision tap sharpening, write us for the recent *Machinery* article, "Why Taps Should Be Sharpened Precisely". It may prove an eye-opener! Descriptive bulletins on both Blake machines are also available at your request.

IT'S A FACT! YOU CAN REDUCE YOUR TAP COSTS 50 to 75% by installing Blake tap sharpening equipment and sharpening your taps as you do other metal cutting tools.

PUT THIS COST-CUTTING COMBINATION TO WORK FOR YOU NOW!



BLAKE CHAMFER GRINDER  
(Described in Bulletin 551)



BLAKE FLUTE GRINDER  
(Described in Bulletin 651)

+

=

ACCURATE, TRUE-CUTTING TAPS  
LESS TAP BREAKAGE  
600% MORE PRODUCTION PER TAP  
UP TO 75% REDUCTION IN TAP COSTS

Write for details about both machines!

**EDWARD BLAKE COMPANY** 438 CHERRY ST., WEST NEWTON 65 MASSACHUSETTS

BLACK DIAMOND PRECISION DRILL GRINDERS...  
WALTHAM CUTTER SHARPENERS...SURFACE FINISH STANDARDS

# **NEW!** position material securely —in **SECONDS!**

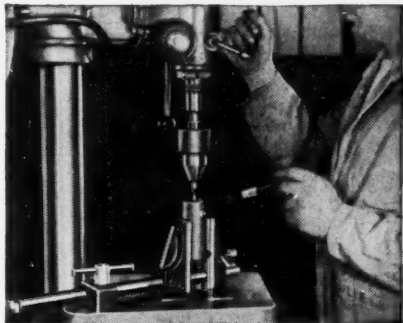
## **AMF FLOAT-LOCK SAFETY VISES**

extend the usefulness of your drill presses and band saws. Reduce material spoilage, prevent tool damage...*save money*. Insure fast, safe, accurate work.

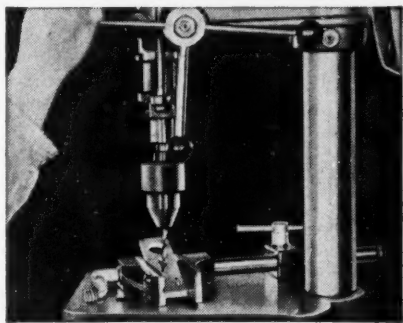
**FOR YOUR DRILL PRESS,** Float-Lock is a full-floating vise for *all* set-ups in tool rooms and production. Locks instantly anywhere on table... becomes a dependable drill jig. Turns over on three sides for maximum flexibility. Eliminates time-wasting clamps, straps, bolts.

**FOR YOUR BAND SAW,** Float-Lock safely and securely holds all shapes and thicknesses of materials. Cutting to close tolerances made easy without hands touching material...simplifies compound angle cutting. Ideal for automatic chain-feed operation.

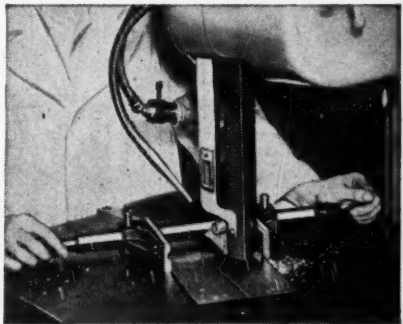
Order from **your industrial supply distributor** or write for illustrated folder to: Wahlstrom/Float-Lock Sales Dept., American Machine & Foundry Company, 511 Fifth Avenue, New York 17, N. Y.



Ideal for centering and end drilling



Perfect for angle drilling



Cutting irregular shapes made easy

*Extensive Stock*  
OF  
**KENNAMETAL TOOLS,  
BLANKS, and INSERTS**  
NOW CARRIED BY OUR  
**DISTRICT WAREHOUSES**

AT STRATEGIC POINTS

**ACROSS THE MAP...**

LOS ANGELES  
CHICAGO  
CINCINNATI  
CLEVELAND

DETROIT  
LATROBE  
PHILADELPHIA  
SPRINGFIELD, MASS.

Phone the one nearest you  
if your need is urgent

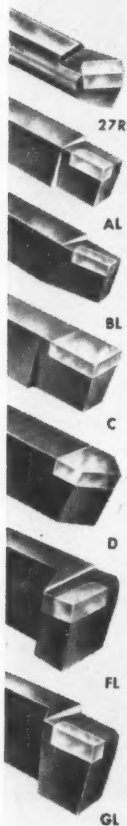
This expanded service enables you to quickly realize the plus value of Kennametal tooling—decreased cost—increased productivity. There's a Kennametal tool for your every need.

If you desire help in tooling problems—selection, application, or maintenance—our field engineers are at your service.

Kennametal Inc., Latrobe, Pa.

**KENNAMETAL®**

CEMENTED CARBIDE TOOLING  
THAT INCREASES PRODUCTIVITY



K3000



TB



"H"



SDH



FRH

# NEW!

## SIMONDS

### "WELD-EDGE"

## Power Hacksaw Blade

It's  
Shatterproof!



BEND IT ..



TWIST IT ...

DROP IT ..

IT'S TOUGH ...  
AND LONG-LASTING!

STEP ON IT ...



HAMMER IT

Here's a Power Blade especially designed to meet all plant safety and performance requirements. A blade so tough it will not snap in operation regardless of abuse, neglect, worn machine condition or improper adjustment. A blade that has a high speed steel cutting edge that resists wear and is adaptable for all types of cutting.

With "Weld-Edge" there will be fewer blade-changes, longer blade life. This means more cuts per blade, higher out-

put per machine and a definite reduction in production costs.

So for safety, dependability and increased output at lower cost, get SIMONDS "Weld-Edge" Blades from your Industrial Supply Distributor. All standard sizes available from stock.

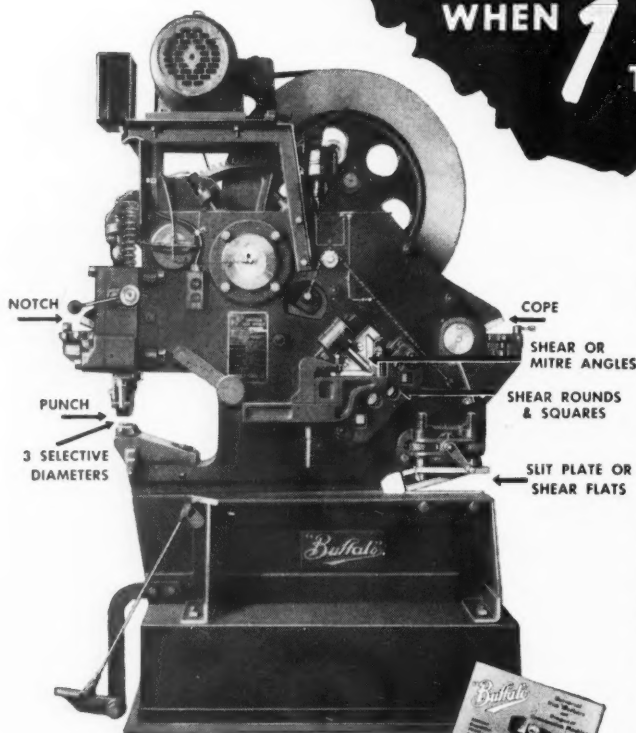


Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.  
Southern Service Shop in Meridian, Miss. (formerly J. H. Miner Saw Mfg. Co.).  
Simonds Division: Simonds Steel Mill, Lockport, N. Y.; Simonds Abrasive Co., Phila., Pa. and Arvida, Que., Canada



## Tips on Metal Working

**WHY BUY 5 MACHINES  
WHEN 1 WILL DO  
THE JOB?**



More and more, manufacturers are concentrating higher production on existing floor space. A good example of this is the "Buffalo" Universal Iron Worker shown. Without tool changes, this fast, rugged machine does up to FIVE operations. Takes the space of ONE machine. Does it save time? One shop's Universal Iron Worker now does in ONE HOUR fabrication that took ONE DAY by other methods.

WRITE FOR BULLETIN 360E NOW for complete information on the 7 sizes and 5 styles to choose from — for LOWER COST FABRICATION!



**BUFFALO FORGE COMPANY**

388 BROADWAY

MACHINE TOOLS

BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING

PUNCHING

SHEARING

CUTTING

BENDING

multiple splines

preloaded  
precision  
ball bearings

hardened  
tang slot

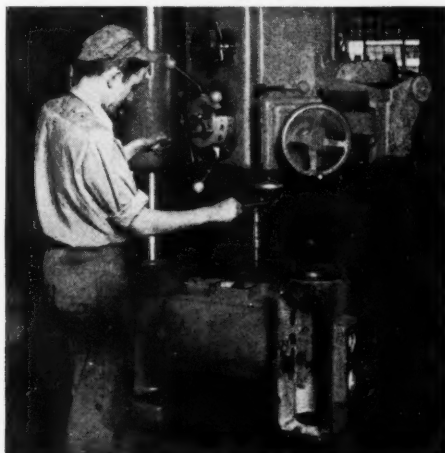
rack teeth cut  
from solid

No. 4 or 5  
Morse taper

# ACCURATE

Job after job, Cincinnati Gilbert spindles stay right on "O". The  $4\frac{1}{4}$ " OD alloy steel quill has a 12" long bearing in the head; spindle is mounted in the quill with three ABEC No. 5 precision, preloaded angular contact ball bearings at the bottom and one at the top. The Gilbert spindle gives maximum accuracy even under strains of improperly sharpened drills, uneven depths of cut, as well as normal thrust load of feeding . . . For sustained accuracy, make your next radial a Cincinnati Gilbert. Write for Bulletin 349.

# FLEXIBLE



In the photo at the right the operator drills and taps a total of 35 holes, on five faces of the casting, by using a Cincinnati Gilbert Universal Table.

RADIALS  
HORIZONTAL BORING MILLS  
ACCESSORIES

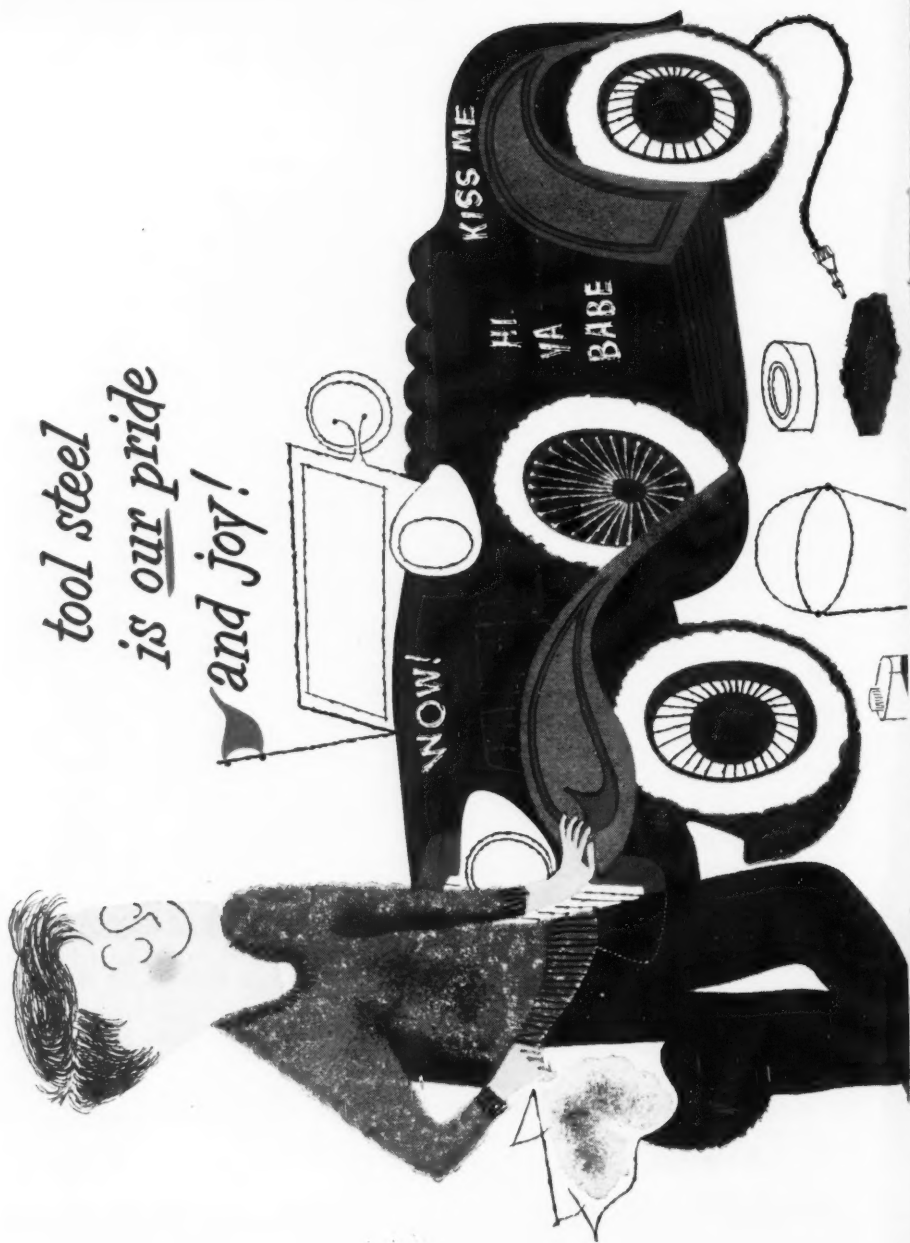
## THE CINCINNATI GILBERT

MACHINE TOOL COMPANY

3366 BEEKMAN ST. • CINCINNATI 23, OHIO

### THOSE WHO BUY GILBERT BUY GILBERT AGAIN

*tool steel  
is our pride  
and joy!*





Rex® High Speed Steels  
Peerless Hot Work Steels  
Halcomb 218  
Chro-Mow®  
Sanderson Carbon Tool Steels  
Ketos®  
Aircool Die Steel  
Airdi® 150  
Nu-Die V Die Casting Steel  
CSM 2 Mold Steel  
La Belle® Silicon #2  
Atha Pneu

SPECIFY  
YOUR TOOL STEELS  
BY  
THESE  
BRAND NAMES

**CRUCIBLE**

52 years of *Fine* steelmaking

CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.

Think of tool steel — think of Crucible! That's the reputation we've had for over half a century with our tool steel users. We've never stopped working to maintain our leadership ... leadership that has kept us the country's *number one* tool steel producer.

Crucible research and development continues to match Industry's need for new and improved tool steels. You can profit from the experience gained by Crucible in the application of tool steels to thousands of uses. Our metallurgical service is freely available to you ... and our conveniently located warehouses maintain a full supply of tool steels for prompt delivery.

SEND TODAY for the unique Crucible Tool Steel Selector — a twist of the dial gives the tool steel for your application.

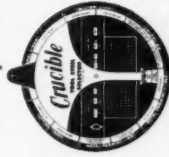
Crucible Steel Company of America

Dept. MS, Chrysler Building, New York 17, N. Y.

Name \_\_\_\_\_

Company \_\_\_\_\_ Title \_\_\_\_\_

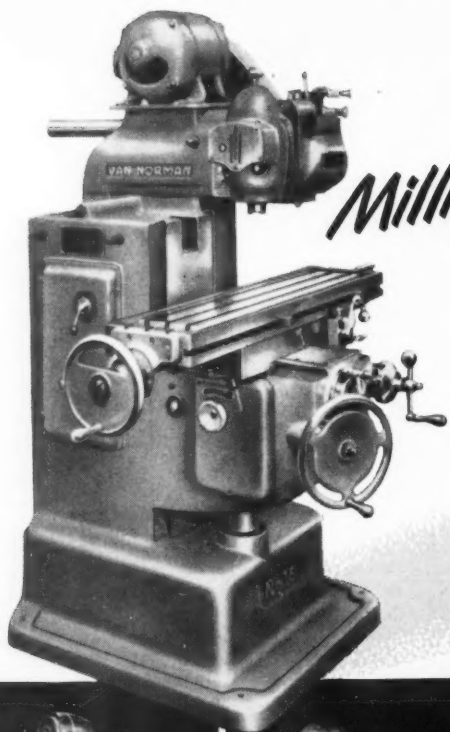
Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_



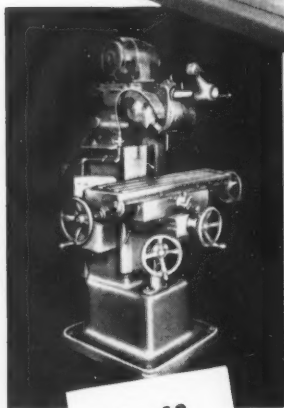
9" diameter,  
3-colors

first name in special purpose steels

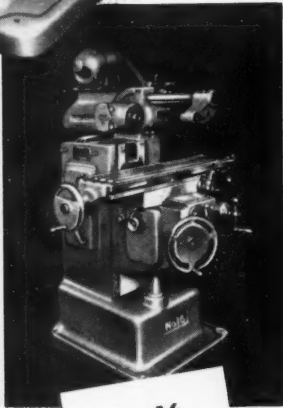
**TOOL STEELS**



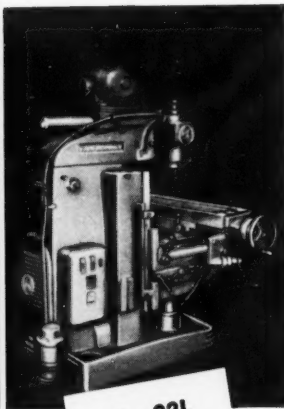
# *Milling Production Simplified*



**No. 12**  
Table: 37½" x 9½"  
Cutterhead in  
Angular Position



**No. 16**  
Table: 37" x 9½"  
Cutterhead in  
Horizontal Position



**No. 22L**  
Table: 45" x 10"  
Cutterhead in  
Vertical Position



**VAN NORMAN**

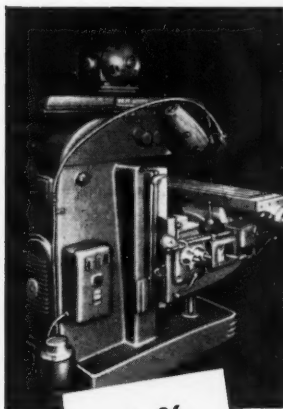
*is Speeded,  
and More Accurate with*

## **VAN NORMAN** **Ram-Type Millers**

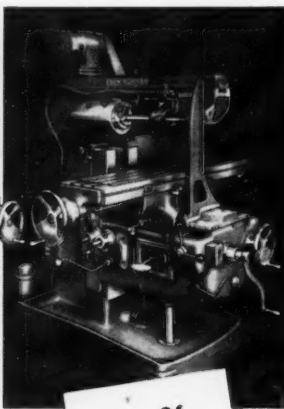
Equip your toolroom and production lines with modern Van Norman Ram-Type Millers that provide new ease of set-up and control . . . smoothness in operation on the heaviest of cuts . . . and plenty of weight and power to keep on turning out work of highest accuracy under the strenuous schedules that today's conditions impose.

Featuring the adjustable cutterhead and movable ram, these Millers enable the operator to go from vertical to angular to horizontal milling with a minimum of resetting of work and with standard arbors and cutters. Operation is simplified because the controls are placed right at the operator's fingertips. Rigidity to maintain accuracy on the heaviest cut is assured by the balanced design of each machine.

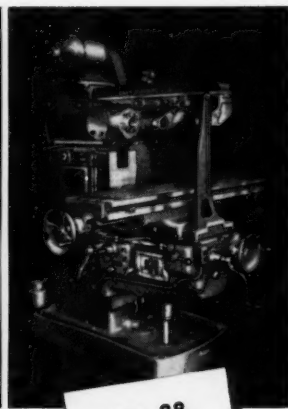
All these features sum up to the highest output, fewest errors, lowest milling cost and machine maintenance. Find out how Van Norman Ram-Type Millers can save on your work. Write for catalogue.



**No. 26**  
Table: 58" x 13"  
Cutterhead in  
Angular Position



**No. 36**  
Table: 64" x 14"  
Cutterhead in  
Horizontal Position



**No. 38**  
Table: 64" x 14"  
Cutterhead in  
Horizontal Position

**COMPANY, SPRINGFIELD, MASSACHUSETTS, U. S. A.**

# *The NEW No 4 AUTOMATIC Screw Machine*



**... for low-cost,  
medium-sized work**

Modern in design, massive in construction, the New No. 4 Brown & Sharpe Automatic Screw Machine shortens set-up and operating time . . . assures continuous, accurate production of medium-sized parts for cameras, automobiles, business machines, time fuses, and other defense items. Wide range of speeds and high-to-low speed ratios make possible highest cutting efficiency on a wide variety of materials and work diameters. Other important features include:

**Full Antifriction-Bearing Spindle** — positive chain drive delivers full power at all speeds.

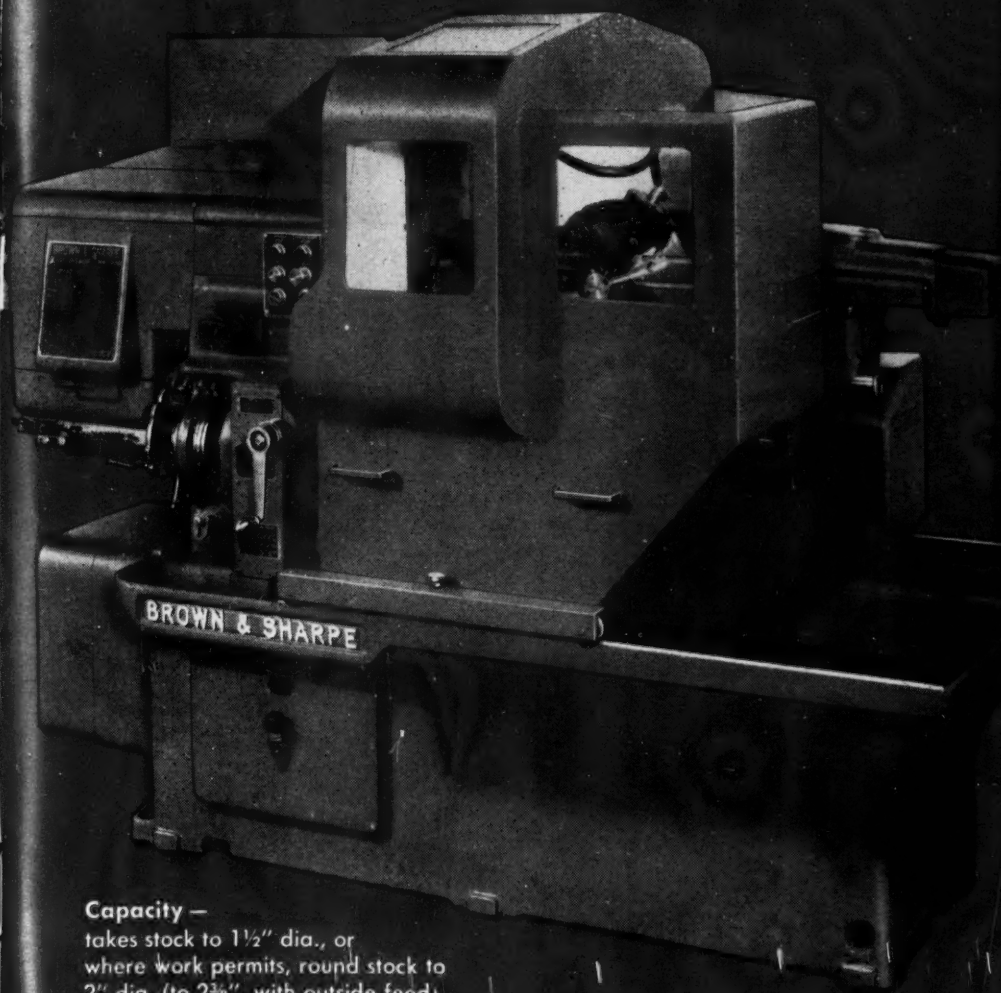
**Vertical Slide** — provides additional tool slide.

**Flat-faced Turret** permits bolting tools directly to face . . . provides firm tool support for heavy cuts.

**Automatic Accelerating Mechanism** — permits speeding up camshaft for any portion of cam contour.

**Simplified Stock Loading** — new bar introduced with minimum effort. Cushioned rolls deaden operating noise.

Write for complete illustrated catalog and specifications. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.



**Capacity —**

takes stock to 1½" dia., or  
where work permits, round stock to  
2" dia. (to 2¾", with outside feed)  
and hex stock to 1¾" across flats.

**Spindle Speed Range —**

168 two-speed combinations from  
17 to 1965 R.P.M. in ratios  
from 2.2: 1 to 13: 1.



***Brown & Sharpe***



*70 feet per minute*

*120 feet per minute*

# **D**roaching compressor wheel slots

Broaching intricately formed slots in aluminum compressor wheels at a speed of 70 feet per minute — with a return stroke of 120 feet per minute — is a practical reality at Detroit Broach. This great broaching advancement is the result of imagination and sound broach-engineering experience . . . a combination forged by years of creative engineering and manufacturing of broaches and broaching tools exclusively.

Whether your application involves a new concept in broaching or the simplest type of conventional broaching, these same factors will benefit you in terms of broaching economy and dependable tooling when you call on Detroit Broach.



WORLD'S LARGEST MANUFACTURER OF BROACHES AND BROACHING TOOLS EXCLUSIVELY

**DETROIT BROACH COMPANY**

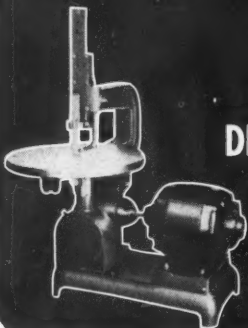
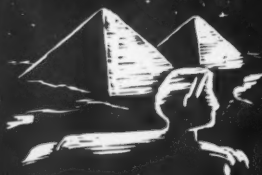
20201 SHERWOOD AVE.

DETROIT 34, MICH.

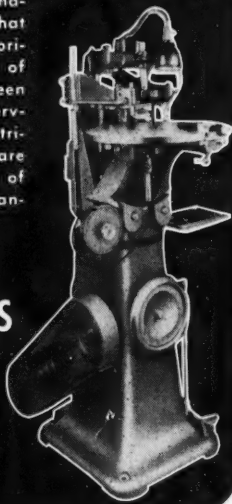
## FAMED for PRECISION

The Great Pyramid of Gizeh Ranks as One of the Seven Wonders of the World

Built by unknown engineers thousands of years ago to cover the Tomb of the Pharaoh Cheops, it is believed, that through the exactness of its orientation and the preciseness of its measurements, to have been built as an astronomical observatory or for recording geometrical facts. Modern scientists are still baffled by the precision of the techniques used in this ancient structure.



### OLIVER DIE MAKING MACHINES ARE FAMED FOR SPEED AND PRECISION



It is a known fact that savings can be effected in toolrooms with Oliver Die Makers—savings up to 60%. In thousands of plants throughout the world, the Oliver Method for machine sawing, filing and lapping operations has increased toolroom efficiency with its speed and accuracy. Many Oliver Die Makers have been in continuous use for more than 25 years, attesting to their long-lasting qualities. Coupled with these advantages is the fact that they are so simple to operate—skilled labor is not required. Save time and headaches... Be Wise, OLIVERize your Toolroom.

#### **Oliver Die Makers available in 5 models—**

The Bench Model 5-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

Write for literature that will save you dollars in your toolroom.

## OLIVER INSTRUMENT CO.

1430 E. MAUMEE • ADRIAN, MICHIGAN

AUTOMATIC DRILL GRINDERS  
TOOL & CUTTER GRINDERS—DRILL  
POINT THINNERS—TEMPLATE  
TOOL GRINDERS—FACE MILL  
GRINDERS—DIEMAKING MACHINES

# "We save \$3,000 a year with 2 SKIL drivers"

—says **Ernest Koller**, general manager,  
**CHENEY WEEDER COMPANY**,  
Cheney, Washington

"SKIL Drivers have boosted production, reduced labor costs amazingly," says Mr. Koller. "We make tillage and harvesting equipment. In the final assembly of each of our 'Grain Saver' combine reels, we drive an average of 680 nuts. Formerly, it took three hours to do this by hand. Now we do it in one-third the time with SKIL Drivers and reduce production costs \$3,000 a year."

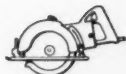


Lee Roy Jackson drives nuts on eye-bolts in another stage of the assembly. He says, "SKIL Drivers do the job faster and far better. They drive each nut tight, and I never get tired—even after a full day of driving nuts."

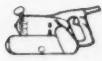


SKIL Driver—Model 303 (Model 300, with reversing switch)—Adjustable clutch, trigger switch. Capacity: 1/4" machine screws and nuts, No. 12 wood screws and self-tapping screws. Standard speeds, no-load: 750 rpm, 1000 rpm, and 1250 rpm, optional. One of 20 models to choose from.

CALL YOUR SKIL DISTRIBUTOR FOR COMPLETE INFORMATION



SKIL Saw



SKIL Belt Sander

**SKIL**  
PORTABLE TOOLS



SKIL Disc Sander



SKIL Drill

SKIL Products are made only by SKILSAW, Inc., 5033 Elston Avenue, Chicago 30, Illinois  
Skilsaw Factory Branches in 34 Principal Cities • In Canada: Skiltools, Ltd., 3601 Dundas Street, West, Toronto 9, Ontario

# *Now!* A NEW CONCEPT IN POWER PRESS OPERATION

Pictured is Famco's 18-ton open-back, inclinable power press featuring the exclusive Electromatic clutch.



**SOLENOID  
OPERATED  
CLUTCH**

**famco**  
*Electromatic*

## **18-TON POWER PRESS**

Famco now offers the most fool-proof, small power press clutch ever designed—the solenoid operated, nine-point jaw clutch. The handy selector switch provides ready changeability from non-repeat single stroke to continuous operation—from on to off positions—plus, a neutral position which locks the clutch, making hand or foot controls inoperative.

The Electromatic 18-ton Power Press gives the greatest versatility and ease of operation, resulting in increased efficiency and production. For further details contact your nearest Dealer, or write for catalog.

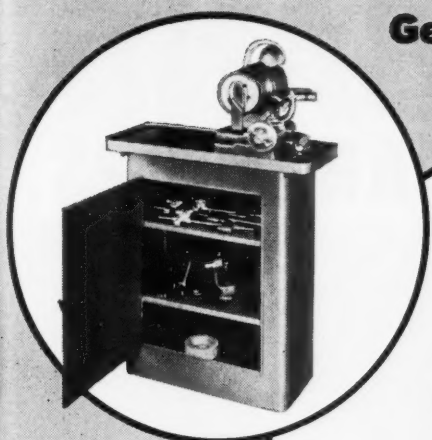
### **CHECK THESE FEATURES**

- 1** EFFICIENCY—Solenoid operated, positive-locking, 9-point clutch jaws for greater efficiency.
- 2** ECONOMY—Less maintenance; minimum production time losses.
- 3** SAFETY—Electrically controlled for safe operation, tooling.
- 4** LONG LIFE—Proved design, rugged, longer-lasting press.
- 5** EASE OF OPERATION—Feather-light foot or hand control.
- 6** SIMPLIFIED CLUTCH CONTROL—Selector switch for single-stroke, neutral, or continuous operation, while press is or is not running.

**famco** COST CUTTING **machines**

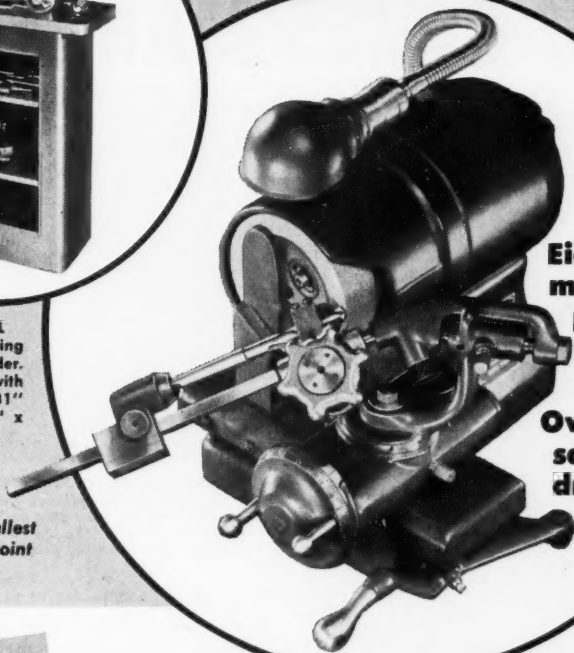
**FAMCO MACHINE CO., 3122 Sheridan Road, Kenosha, Wis.**

**Get more than twice the  
usual life from your drills**



**CABINET-PEDESTAL**  
Available for mounting  
the No. 1-G Drill Grinder.  
Made from steel with  
wooden shelves. 31"  
high from floor. 13" x  
30" top.

*Gives even the smallest  
drill a production point  
that pays a profit*



**Eight times  
more holes  
per grind**

**Over 90%  
saving in  
drill cost**

*Among Heavy Machine  
Tools built by  
Consolidated are . . .*

LATHES  
BORING MILLS  
DRILL PRESSES  
MILLING MACHINES  
BORING MACHINES  
COLD SAW MACHINES  
BORING, DRILLING AND  
MILLING MACHINES  
DRILL AND TOOL  
GRINDERS  
PLANERS  
SLOTTERS  
RAILROAD SHOP TOOLS  
AUTOMOTIVE TOOLS  
AND OTHER  
SPECIAL MACHINES

### **SELLERS NO. 1-G DRILL GRINDER WITH BALL BEARING SLIDE**

This small, self-contained, bench-type grinder embodies the sound features that have conclusively demonstrated their superiority in the larger Sellers Drill Grinders. Foremost among which are the basic principles and inherent accuracy of the Sellers Chuck and the Sellers advanced method of drill grinding. This grinder produces the Sellers point on a single drill or an exact duplication on as many drills as are required. It grinds right hand 2 lip twist drills from .028" (No. 70) up to 1/2" diameter to any included angle of point from 80° to 160°. Designed with ball bearing slide, ball bearing swing frame and quick-adjusting tail center which combined provide increased accuracy, reduced wear and further simplification of operation and adjustment. Sellers Drill Grinders are built to last. Part replacements are negligible, however, if required, replacement parts are always available. Complete information will be furnished upon request.

**BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848**

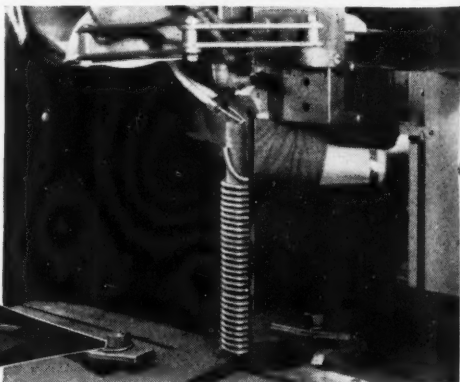
BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS



# **CONSOLIDATED MACHINE TOOL CORPORATION**

SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED  
**ROCHESTER, NEW YORK**

# DoALL BAND SAVES MAN HOURS,



**BAND MACHINING DOES JOB IN 1/3 THE TIME** — this job of splitting rings from coiled 1/4" cold rolled steel was formerly done on an expensive milling machine. On a DoALL Contour-matic it is done in 1/3 the time and at far less cost!

**THE DoALL CONTOUR-MATIC** (illustrated at upper left). This is the most versatile, fastest cutting machine ever introduced to American Industry. It will pay for itself faster than any other machine tool equipment you can buy. Anyone can learn quickly to operate it. Its 40 to 10,000 feet per minute speed range, its hydraulic and automatic controls, its labor-saving accessories make it the most productive band machine in the world and one of the most valuable pieces of equipment you can own.



## ← SAW BANDS, OTHER BAND TOOLS FOR EVERY PURPOSE

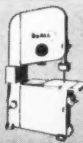
**Immediate Delivery from Local Stocks**  
Saw bands for all makes of band machines and cut-off saws available immediately from any one of the 35 DoALL Sales-Service Stores. Sold in 100 and 500 ft. lengths or cut and welded bands to fit your machine.



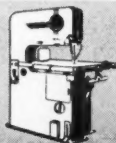
B-13-5



CONTOUR-MATIC



ZEPHYR



CONTOUR

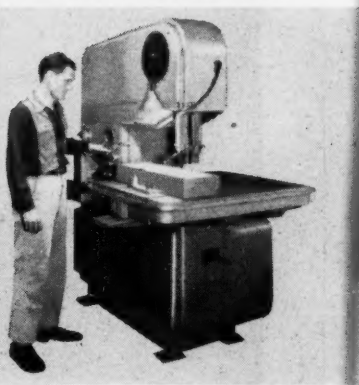
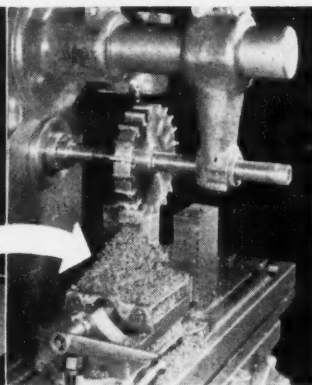
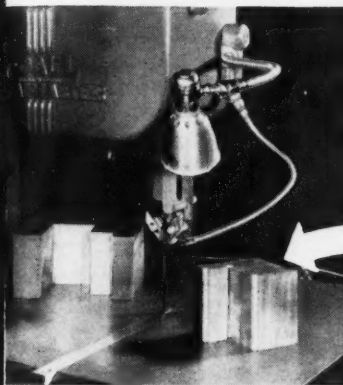


BAND FILER



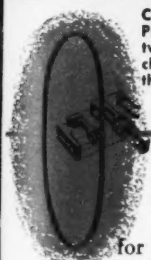
SAW BANDS

# MACHINING METALS AND MACHINES



**CONTOUR MACHINING SAVES METAL BY CUTTING OUT COMPLETE PIECES** — these pictures tell a terrific story. Here are two identical shapes cut from identical stock. Ordinary machining reduces it to a pile of chips. Contour machining saves the slug of metal for other use.

**DoALL CONTOUR-MATIC FREES \$35,000 MILLING MACHINE FOR OTHER WORK** — rough cutting of aluminum aircraft forgings on a DoALL Contour-matic — a machine that represents about 1/6 of the capital investment in milling machines formerly tied up on this operation.



**THERE IS** a place for DoALL Band Machining in every industry for production or maintenance work.

**Cuts Continuously** — the endless band slices through the material, cutting all the time, all the way, leaving only a thin slot in its wake. It's the world's fastest method of machining the greatest variety of materials to shape.

**Direct Cutting of Intricate Shapes** — it's easy to follow any layout line with the narrow band tools used.

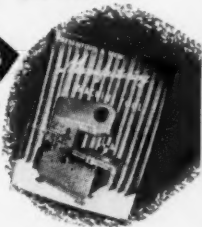
**Cuts Any Material** — there is a DoALL Band Tool for every sawing, filing, grinding, polishing or friction sawing job on all metals, glass, wood, cloth, leather, rubber, paper, plastics and other materials. Use it to make tools, dies, jigs, parts; to trim, shape, file, polish.

**A Machine for Every Purpose and Every Pocketbook** — from the inexpensive "Utility" series to the

versatile, all-purpose Contour-matic, there is a DoALL Band Machine for you — the most complete line in the world. Ask to have a free **DEMONSTRATION** made in your own plant. Call your local DoALL Sales-Service Store or write:

**SEND FOR THIS CATALOG**

Learn what DoALL Band Machining can do to save man-hours, metals and machines for you.



**DoALL**

for more  
production



TOOLROOM GRINDER



CRUSH GRINDER



GAGING EQUIPMENT



MONOLITE

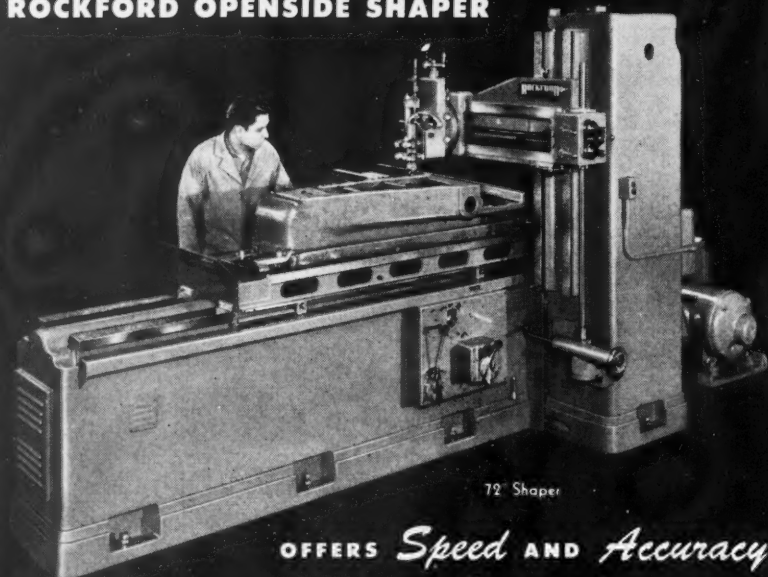


MOBILE INSPECTION UNITS



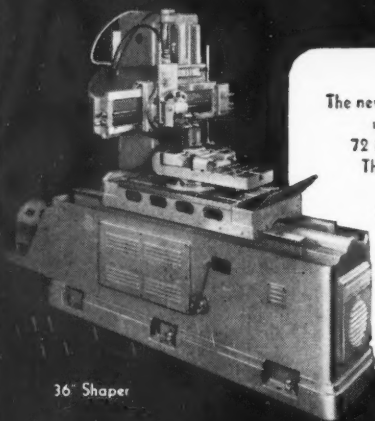
TOOL STEEL

**NEW.....**  
**ROCKFORD OPENSIDE SHAPER**



72" Shaper

**OFFERS** *Speed AND Accuracy*  
**PLUS** *Versatility*



36" Shaper

The new 72" Rockford Openside Shaper gives you best results on all shaper jobs — with stroke lengths up to 72 inches.

This "big brother" of the Rockford Openside Shaper family (36", 48", 60", 72") has all the superior features of companion models, *plus* increased capacity. It's the maximum in versatility — large-job capacity with no sacrifice in speed or accuracy. And it's *Hydraulic* . . . of course.

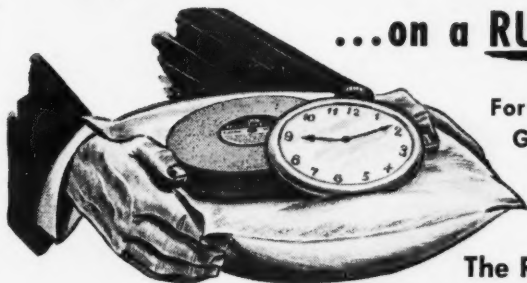
Before you invest, investigate the new 72" Rockford Openside.

*Hy-Draulic*

**ROCKFORD MACHINE TOOL CO.**  
2500 Kishwaukee Street • Rockford, Illinois

# Increased TIME SAVINGS in Finishing

...on a **RUBBER CUSHION!**



For All Metals, Plastics, Wood,  
Glass, Hard Rubber, Pressed  
and Laminated Materials  
and Combinations

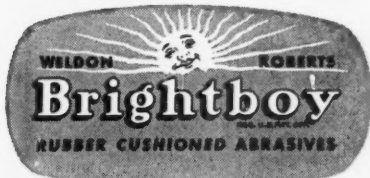
The RUBBER CUSHIONING in  
Brightboy Abrasives gives you combined  
**BURRING • FINISHING • CLEANING • POLISHING**  
in one operation

You get the working advantages of *both* abrasive and rubber—at savings of up to 50% in finishing time. Brightboy's unique, gratifying surfacing action occurs as the rubber binder gently "cushions" the effect of the abrasive the moment machine or manual finishing begins. • Surface, work quality, time savings, versatility, will be a revelation to you. You will find that Brightboy will do many things other abrasives can't. It will give you a refreshingly new, immensely wider concept of finishing.

**HOW BRIGHTBOY SAVES PRODUCTION TIME:** Brightboy does countless jobs conventional abrasives cannot do—PLUS low-cost, "everyday" finishing. Bridges the gap between the rough grind and the buff. Works to close tolerances; can be shaped to contour. Produces a wide variety of conventional and special finishes and patterns; (damaskeening, for example); frequently the final polish. Requires no before-use preparation or dressing; no skilled labor to handle it.

**A FEW OF MANY GENERAL USES:** Removing light digs, tool and heat marks • Cleaning welded and soldered joints • Finishing dies and molds • Burring stampings, castings, machined parts.

WHEELS, STICKS,  
RODS, BLOCKS  
in three textures  
for machine and  
manual operations



**BRIGHTBOY INDUSTRIAL DIVISION  
WELDON ROBERTS RUBBER CO.**

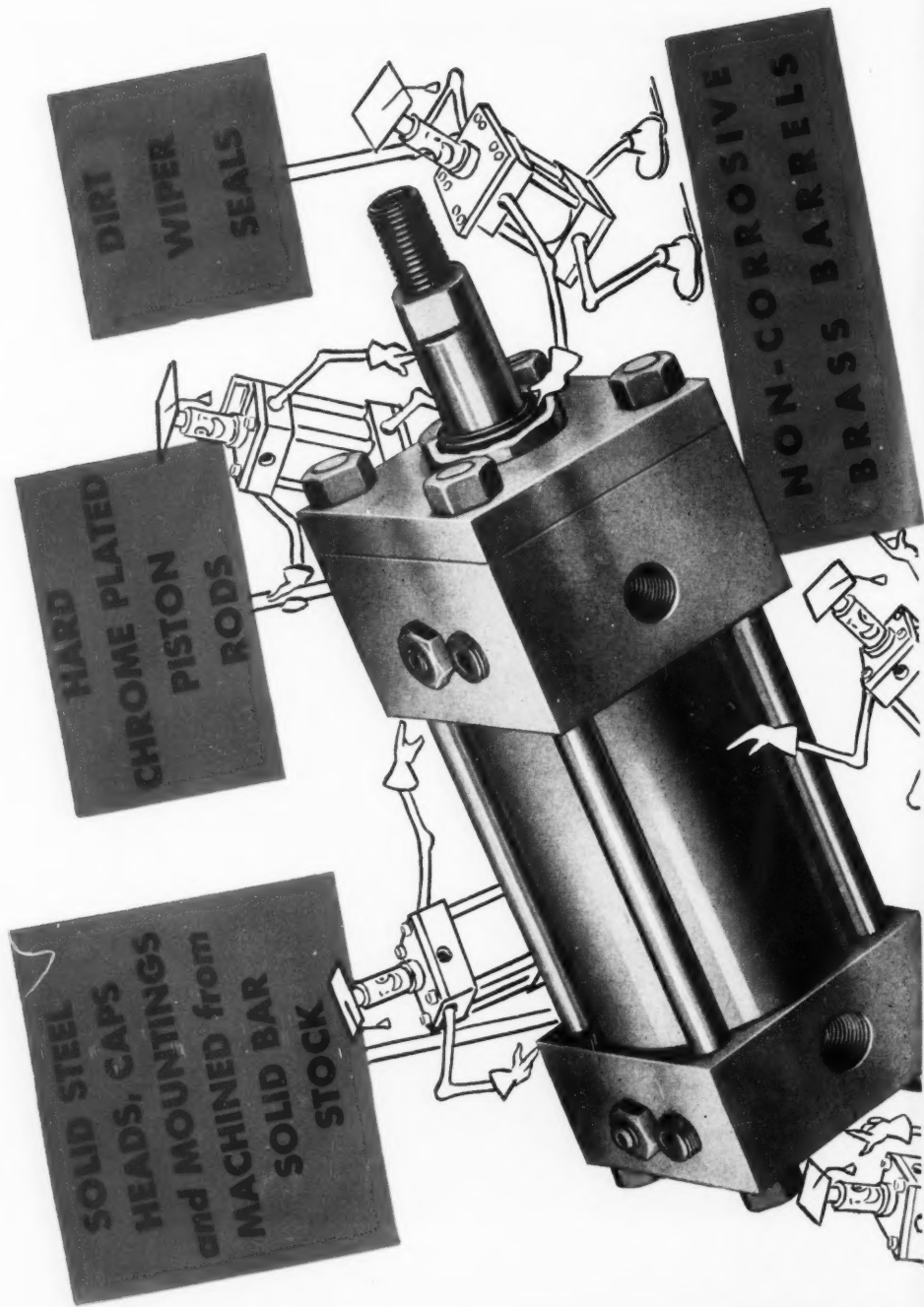
6th Ave. & No. 13th Street Newark 7, N. J.

America's Pioneer Manufacturer of  
Rubber-Bonded Abrasives

Ask your dealer for the Brightboy introductory sample card and the Brightboy Catalog Manual. Write us if he cannot supply you or if you have any problems in which finishing is involved.

**Everybody's talking about Brightboy**  
*The Abrasive-and-Rubber Revelation for Finishing!*

**DOING DEFENSE WORK — OR MAKING CIVILIAN GOODS?** Investigate the wide adaptability of Brightboy. Proved in defense-production applications (Ordnance, Instruments, Airplane Parts, Internal Combustion and Jet Engines, Electrical, Electronic, Transportation and Communication Equipment) and in manufacture of an almost limitless variety of civilian goods and appliances.





*Benefits to you*

**No Broken Castings  
No Scratch-Damage  
to Piston Rods,  
Bushings and Seals**

**NO COSTLY  
"DOWNTIME"  
NO REPAIRS  
NO MAINTENANCE  
NO POWER WASTAGE**

**Sales and Service from coast to coast**

# AIR CYLINDERS

## FOUR-WEEK DELIVERY

To Meet Your

**RUSH**

**Cylinder Requirements**

... now assured by our modern new plant with greatly expanded facilities — devoted exclusively to the manufacture of quality cylinders.

**Write for illustrated cylinder bulletins A-105 and H-104**

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1½" TO 6" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" TO 12" BORES, 2000-3000 PSI OPERATION, ALL MOUNTING STYLES AVAILABLE.



**MILLER MOTOR COMPANY**

2024 N HAWTHORNE AVE., MELROSE PARK, ILL.

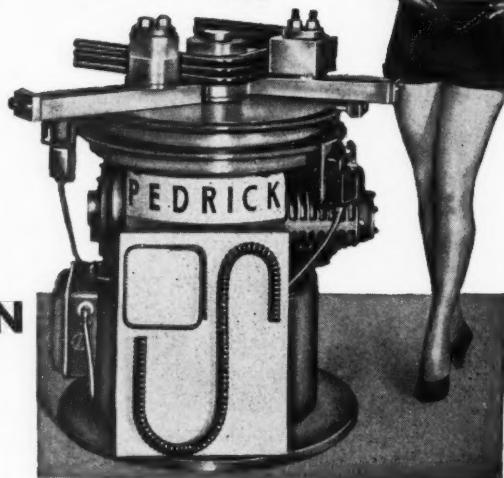
AIR AND HYDRAULIC CYLINDERS — ACCUMULATORS — COUNTERBALANCE CYLINDERS — RODS —

CLEVELAND — YOUNGSTOWN — DAYTON — PITTSBURGH — PHILADELPHIA —  
BOSTON — HARTFORD — NEW YORK CITY — BUFFALO — ST. PAUL — DETROIT —  
GRAND RAPIDS — FLINT — FORT WAYNE — SOUTH BEND — INDIANAPOLIS —  
MILWAUKEE — LOUISVILLE — KANSAS CITY — SEATTLE — LOS ANGELES — SAN  
FRANCISCO — BALTIMORE — DENVER — ST. LOUIS — MOBILE — CHICAGO —  
HOUSTON — TORONTO, CANADA, OTHER AREAS.

## **PEDRICK PRODUCTION BENDERS**

**FOR REINFORCING BARS**

**SO  
SIMPLE  
THAT  
A GIRL  
CAN RUN  
THEM**



Bending Concrete Reinforcing Bars is simple with a Pedrick Production Bender. Merely put the bars in and push the button. The machine bends to the desired curve and automatically resets itself to the starting position. The machine will handle rerolled railstock without breakage. Floor space required is three feet square. The same machine will bend Pipe and Tube with suitable dies. Price of the machine \$1975.00, U. S. Funds, F.O.B. Factory.

*Smaller and larger machines available.*

**WRITE FOR  
DESCRIPTIVE  
FOLDER  
DEPT. 5**

**PEDRICK  
TOOL AND  
MACHINE  
COMPANY**

**3640 N. Lawrence St.  
Philadelphia 40, Pa.  
U.S.A.**

# SOUTH BEND

Lathes • Drill Presses • Shapers for More Efficient Machining

This new South Bend catalog contains illustrations, descriptive material and specifications of all sizes and types of South Bend Lathes, Drill Presses and Shapers. It also shows the complete line of South Bend accessories, chucks, tools and attachments. Complete in every detail, this catalog is a valuable reference book which every shop man should have. Send for your free copy today.

#### PARTIAL LIST OF CONTENTS:

**Engine Lathes** — 9", 10", 13", 14½", 16" and 16-24" swing. **Bench Lathes** — 9" and 10" swing in standard change gear, quick change gear and toolroom models. **Toolroom Lathes** — 10", 13", 14½" and 16" swing. **Turret Lathes** — ½" collet — 9" swing; 1" collet — 10" and 16" swing. **Drill Presses** — 14" capacity Precision and Economy models; also multiple head Production models. **Shaper** — 7" bench model with or without stand. **Accessories** — for lathes, drill presses and shapers.

**SOUTH BEND LATHE**, South Bend 22, Ind. Please send Catalog 5205. I'm particularly interested in \_\_\_\_\_

Name \_\_\_\_\_

Company \_\_\_\_\_

Street \_\_\_\_\_ City & State \_\_\_\_\_

**SOUTH BEND LATHE** • Building Better Tools Since 1906 • South Bend 22, Ind.

September, 1952

MODERN MACHINE SHOP 55



**UNION TWIST DRILLS** are made in the broadest range of types, to cover every drilling operation — no matter what your material or drilling equipment may be.

For fast, free-cutting performance, minimum breakage and more work between re-sharpenings, see your Union Distributor for the drills that are *right* for you

**FIRST TEAM IN CUTTING TOOLS . . .**

**UNION** and your *Local Distributor*



**UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS • Milling Cutters • Gear Cutters • Twist Drills • Hobs • Reamers • Carbide Tools**

We own and operate S. W. CARD MANUFACTURING CO. Division, Mansfield, Mass., Taps, Dies, Screw Plates . . .

BUTTERFIELD DIVISION, Rock Island, Que., Milling Cutters, Twist Drills, Hobs, Reamers, Taps, Dies, Screw Plates

# GORTON PANTOGRAPH

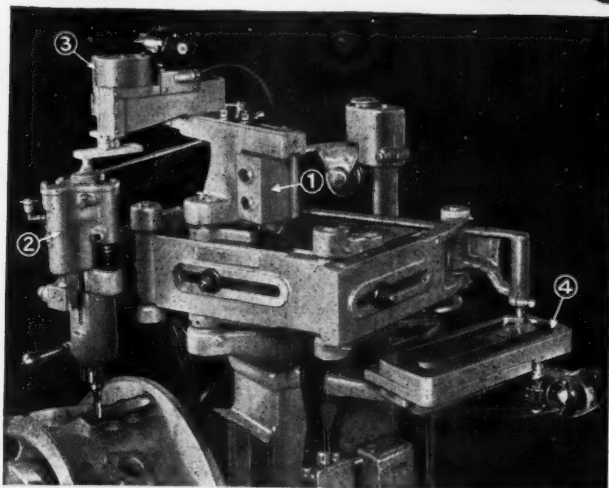
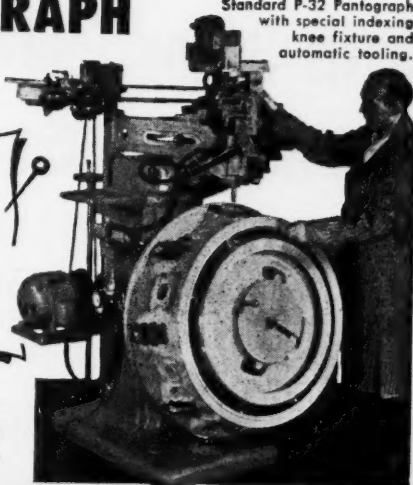
**Solves Complex Profiling Problems  
with Automatic Cutting Cycle**

**PROBLEM:** Profiling eight ports in outside portion of aircraft part, a large aluminum-alloy casting. The sides of each port are parallel; one end has a true radius, the other end is parabolic.

**SOLUTION:** Gorton P-32 Pantograph profiles all eight ports at the rate of 2.3 minutes per port. Cutting cycle is automatic; indexing is manual.

**This is truly a power-driven tracer-control job that would require hours if done by a combination of other methods.**

Standard P-32 Pantograph with special indexing knee fixture and automatic tooling.



## Here's How It Works

- ① Complete cutting cycle begins when "start" button is pressed.
- ② Air cylinder automatically feeds cutter down to cutting position. Cam-operated spindle down feed then takes over. Upon completion of cut and after spindle retracts, this air cylinder further retracts cutter for clearance.
- ③ Speed of spindle down feed during cutting is controlled by cam through a Variac.
- ④ Motorized chain-driven master starts automatically when "start" button is pressed.

This is just one of many Gorton tracer-controlled production short-cuts which might save you time and money. For complete information, clip and mail the coupon now.

**GEORGE  
GORTON  
MACHINE CO.**

1709 Racine St., Racine, Wis., U. S. A.

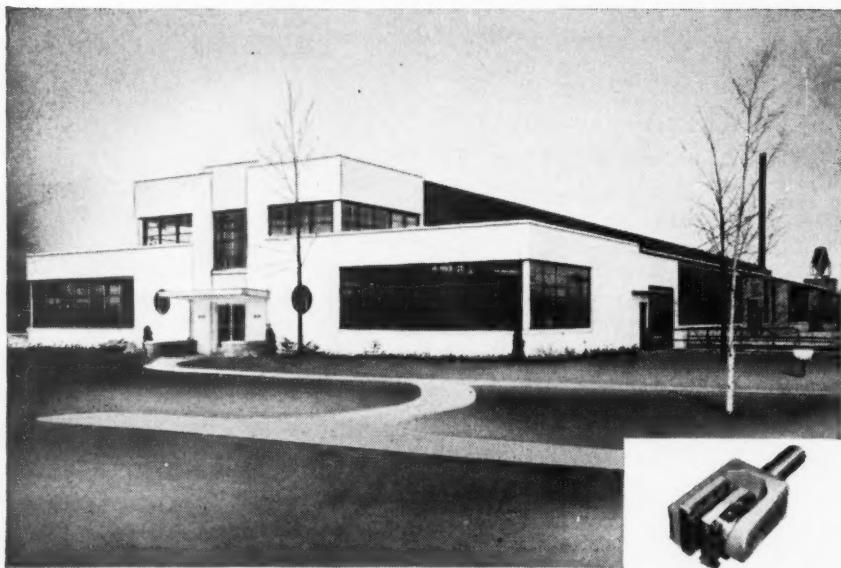


Please send at once complete information about the Gorton line contained in Bulletin 1655-1709.

Firm .....  
Name .....  
Title .....  
Address .....  
City, State .....

A 7133-1P-A

# Davis Boring Tool increases facilities to give you even better deliveries



## New 30,000 sq. ft. plant will be producing Davis tools for you by mid-year

Here's one manufacturer who's doing something in 1952 to help you out with deliveries on standard and special boring, turning and planing tools.

Giddings and Lewis Machine Tool Co., recently purchased a new plant for its Davis Boring Tool Division that will increase production of Davis Boring Tools by 50%.

Now's the time — when deliveries look better — to standardize your shop on "Davis Complete Tooling Service." You can increase your production with present equipment, lower your costs and be sure of sharing in the very latest development in tool design. Write for complete details.



**DAVIS BORING TOOL DIVISION**

GIDDINGS AND LEWIS MACHINE TOOL COMPANY  
FOND DU LAC, WISCONSIN



New 8-position tool holders



Black-type line boring tools. Planer and vertical boring mill tools.



Davis Super Micrometer Stub Boring Tool Sets.



# Boyar-Schultz

## No. 2 PROFILE GRINDER

*... for grinding Irregular  
Shapes and difficult Contours*

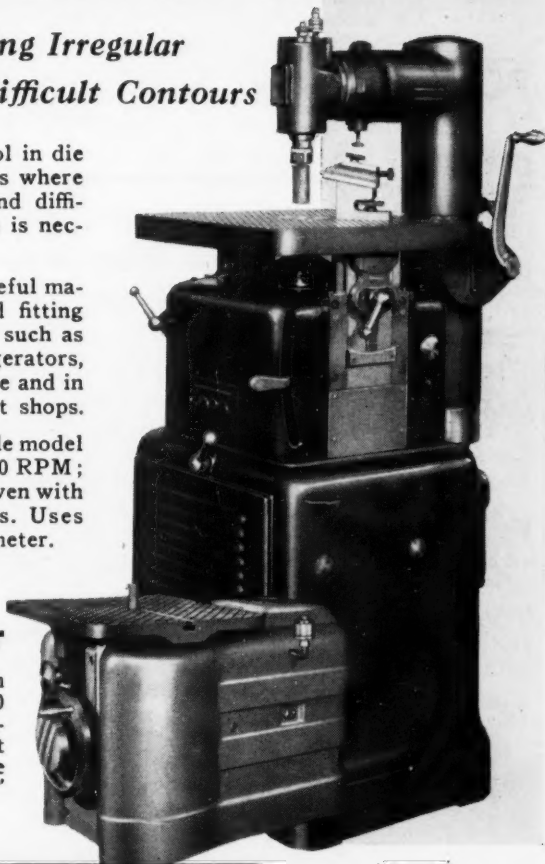
A standard machine tool in die shops and in tool rooms where grinding odd shapes and difficult, irregular contours is necessary.

It is a particularly useful machine for grinding and fitting large dies and punches such as forming dies for refrigerators, table tops, sanitary ware and in automotive and aircraft shops.

Spindles in dual spindle model illustrated, turn at 10,000 RPM; stock removal is rapid even with small diameter wheels. Uses wheels  $\frac{1}{4}$ " to 3" in diameter.

### No. 1 Profile Grinder

A bench model with spindle speed of 20,000 RPM. Performs in minutes, many jobs that would ordinarily require hours. Uses wheels  $\frac{1}{8}$ " to 1" diameter.



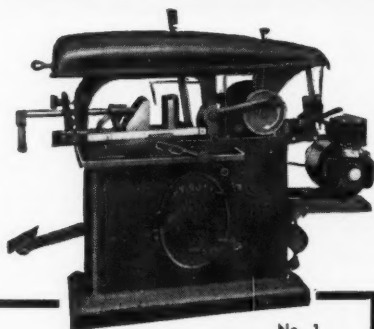
**BOYAR-SCHULTZ**  
C o r p o r a t i o n

2120 WALNUT STREET, CHICAGO 12, ILL.

WRITE  
FOR LITERATURE  
FULLY DE-  
SCRIBING THESE  
TIME SAVING  
MACHINE TOOLS

# FOR FAST, LOW COST CUTTING

## Select a KELLER POWER HACK SAW



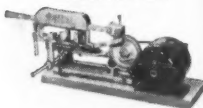
No. 1  
Floor Model



No. 1  
Bench Model



No. 1 HB  
Bench Model with  
Automatic Lift



No. 601  
Jefferson

**Choose from 8 models—  
Prices from \$71.50 to \$497.00**  
F.O.B. Eau Claire, Wisconsin

There's an efficient, fast-operating Keller Power Hack Saw of the size you need and at the price you want to pay. Keller Saws will handle cutting jobs from heavy bars to thin wall tubing with capacities up to  $6\frac{3}{4}$ " x  $6\frac{3}{4}$ ". Designed for simple operation, low maintenance, and long blade life, Kellers have been standard equipment for years in shops and factories from coast to coast.

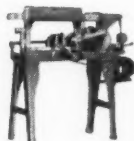
**Specify Keller Power Hack Saws! Write today, for full information on the complete Keller line!**



No. 1HF  
Floor Model with  
Automatic Lift



No. 3 B  
Dry Cut with  
Automatic Lift



No. 3C  
Wet Cut with  
Automatic Lift



No. 3CH  
Wet Cut with  
Automatic Lift



No. 3 Hy-Duty  
with Variable  
Blade Pressure  
Control

### *Sales Service Machine Tool Co.*

PRESS RITE PRESSES • SHAPE RITE SHAPERS • KELLER POWER HACK SAWS

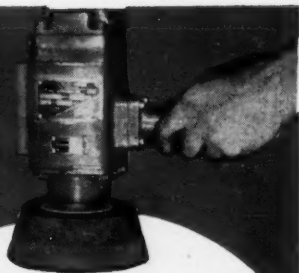
2355 UNIVERSITY AVENUE • ST. PAUL 4, MINNESOTA



Belt Sanders
Bench Grinders
Drills
Drill Stands
Fender Hammers
Grinders
Electric Hammers
Impact Wrenches
Nibbler
Nut Setters
Pollishers
Sanders
Saws
Screw Drivers
Tappers
Valve Refacers
Valve Resizers
Air Tool Kits



## AIR GRINDERS SANDERS WIRE BRUSH MACHINES



# 50 MODELS



DIE GRINDERS



HEAVY DUTY  
PRODUCTION GRINDER

VERTICAL  
GRINDERS



Every buyer should have  
this Air Tool Catalog P-1.  
Write today for free copy.

For power when you need it in portable grinding . . . for long lasting service on even the heaviest jobs . . . for economical operation—yes, and for selection of the right grinder for your job from the *complete range*, and with the help of experienced engineers . . . consult THOR, air tool maker since 1893. Call your Thor branch for a free demonstration. Independent Pneumatic Tool Co., Aurora, Ill.

## Thor TOOLS

ELECTRIC • PNEUMATIC



**42 SECONDS—FLAT!**

... a new threading record  
for the CRI-DAN "D"

Product: Diesel Engine Stud  
Size: 2½" Diameter; 2½" Thread  
Length; 4-pitch thread  
Material: 4150 S.A.E. Steel  
30-32 Rockwell "C"

Here's another example where the fabulous Cri-Dan "D" threading machine licked a tough threading job in *seconds* that would have normally taken *minutes*.

This time the part was a Diesel Engine Stud, 2½" in diameter in which a 4-pitch thread 2½" long had to be cut in 4150 S.A.E. Steel. The well-known company\* doing the job reports phenomenal re-

sults in accuracy as well as speed using the Cri-Dan "D" with a single carbide tipped tool.

Whether you have an unusually tough threading problem where accuracy is at a premium, or a threading operation you'd like to speed up, by all means check with your Lees-Bradner representative and get the facts on the Cri-Dan "D".

\*Name on Request

**the LEES-BRADNER**  
CLEVELAND 11, OHIO, U.S.A.  
*Company*

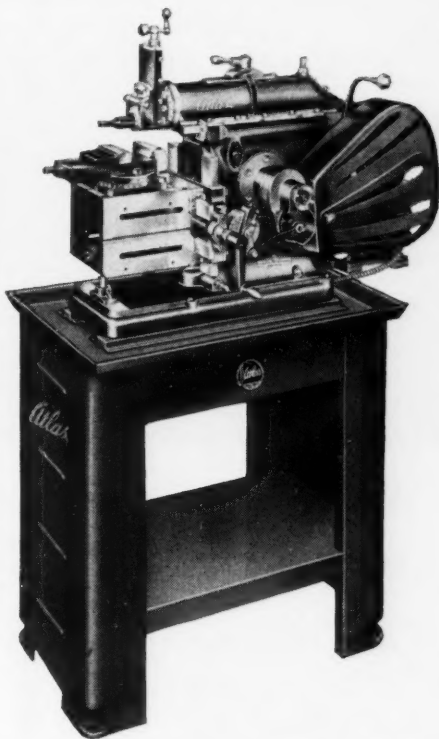
# Puts Small Parts Shaping On A Truly Efficient Basis

## Atlas

### 7" SHAPER

Are you shaping small parts on a big machine? The Atlas saves set-up time, and power — machines to close tolerances — and releases your big equipment for the work it's best suited to handle.

The Atlas is the only 7" shaper that is *Timken bearing equipped* — the only 7" shaper with *roller bearings on countershaft spindle*, *cast iron bull gear with 1" face*, and provision for *outside stroke adjustment*. Built exceptionally heavy and rugged. Has ground ways, 4 speeds, 5 reversible automatic power cross feeds. These are just the highlights of this fine shaper. Send for the catalog with full details.



SEND FOR  
**FREE**  
CATALOG

## ATLAS PRESS COMPANY

912 NORTH PITCHER STREET

KALAMAZOO, MICHIGAN

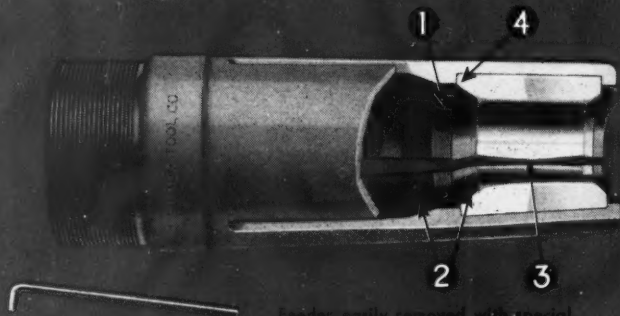
## Atlas

DEPENDABLE QUALITY TOOLS SINCE 1911

**SUTTON STYLE "L"**

# MASTER FEEDERS

*lower production costs*



Feeder easily removed with special wrench to insert or remove pads

**1** Slot in master engages lug on one of the pads, preventing pads from rotating.

**2** Tapers on pads and in master give proper lead and allow stock to enter easily.

**3** Double angle on side of pad permits worn pad to be brought back to gripping size.

**4** Recess in master receives pads and takes operating thrust. **NO SCREWS OR PINS TO VIBRATE LOOSE.**

#### NO PINS OR SCREWS

No pins or screws are necessary to hold feeder pads in place. Pads are seated in a recess in the master and a lug on one of the pads engages a slot in the master, keeping the pads from rotating.

#### COMPENSATION FOR WEAR

Each pad is made with a double angle on each side. Hole size of the pad can be restored by grinding down the points of the angles, allowing tension to bring the pad sections together.

#### SELECTIVE HEAT TREATMENT

The conventional solid feeder is subjected to 3 heat treatments within a length of 4 to 6 in. The Style "L" is made separately from the gripping pads, which are made from steel selected for wear-resistance.

#### ONE MASTER PER SPINDLE

Style "L" Masters handle a range of stock practically up to machine capacity. One master and different sets of pads will take care of the full range of one machine.

Department MMS-9, Sutton Tool Company, Sturgis, Michigan

# SUTTON

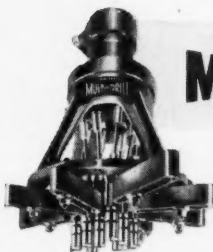


# COLLETS

# Commander PRODUCTION TOOLS

## SPEED PRODUCTION...

## LOWER COSTS



### *Adjustable* **MULTI-DRILL**

- Adjustable To Any Hole Pattern
- Drill 2 to 8 Holes at 1 Stroke
- Fits Any Drill Press

Increase production up to 800%—save time, cut costs. Mounted without alterations or special tools. 9" drilling area; centers to  $\frac{1}{2}$ ". Extension Spindles available to increase area to 22 $\frac{1}{2}$ ". Special adaptations available.

*"The taper that thinks for its operator"*

Adjustable full range torque control instantly stops any tap when it's dull, loaded, strikes a hard spot, or bottoms in blind hole tapping. Assures maximum production, cuts rejects, even with inexperienced operators.



### *Commander* **TAPPER**

- Wider Range . . . 1 Tapper Handles No. 0 to  $\frac{3}{4}$ " Taps
- Automatic Tap Protection
- Furnished to Fit Any Drill Press

- Complete Coolant System Contained in Precision Ground Drill Press Table
- 1 to 8 nozzles . . . easily positioned
- Table always square with Spindle

### **DRILLING COOLANT TABLE**

DRILLING COOLANT TABLE is complete with pump, motor, reservoir and nozzles . . . provides plenty of coolant where and when you want it. Leveling device assures squareness with spindle.



*Write FOR*  
**CATALOG**

and the name of your nearby  
Commander Distributor

## *Commander* MFG. CO.

4219 W. KINZIE STREET • CHICAGO 24, ILLINOIS

# Sure Spec Drill Rod

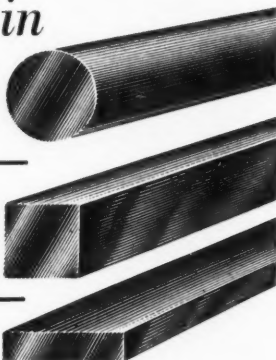
## Finest Quality in

*Sure Spec Drill Rod  
is high grade  
tool steel... comes  
in manufacturer's  
standard sizes  
at low prices!*

**ROUNDS**  
from .013 to 2"

**SQUARES**  
from  $\frac{1}{16}$ " to 1"

**FLATS**  
from  $\frac{1}{16}$ " x  $\frac{1}{8}$ " to  $\frac{1}{2}$ " x 1"



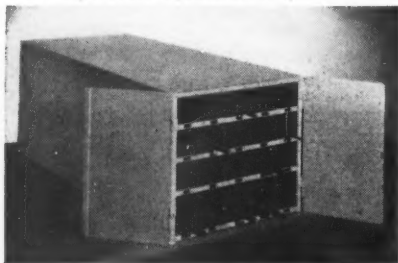
### See! this easy purchase plan...

One of these safe, sturdy compartments designed to protect your drill rod, is yours on this easy plan:

1. You may get the cabinet or the floor rack free with an initial order of \$150 of Sure Spec drill rod.
2. Or you may get a \$24.95 credit for the cabinet or a \$15 credit for the floor rack if your initial purchase of \$150 worth of Sure Spec Drill rod is within a 90-day period.

Send your order for plan 1 or 2 today

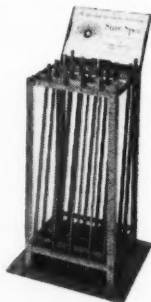
WRITE TODAY to our nearest office shown below for a comprehensive data book detailing all the facts about Sure Spec drill rod, such as sizes, analysis, uses and treating. Also, at your request, one of our sales engineers will call to discuss your particular drill rod requirements and quote prices.



With these safe, sturdy compartments to store and protect it!

Cabinet is all steel. Painted orange and black. Stocks 3-foot lengths. Has 20 separate bins.

Floor rack is all steel with composite floor mat to protect ends. Painted orange and black. 20 separate compartments. Stocks 3 foot and longer lengths.



"for service dependable as the sun"

## SOLAR STEEL CORPORATION

General Offices: UNION COMMERCE BUILDING, CLEVELAND, OHIO

See your local classified telephone directory for our nearest office address

SALES OFFICES: Chicago • Cincinnati • Cleveland • Detroit • Grand Rapids • Kalamazoo • La Porte, Ind. • Milwaukee • Nashville • New Haven • Philadelphia • River Rouge, Mich. • Rochester, N. Y. • Toledo • Union, N. J. • Washington, D. C. • Worcester, Mass.

# you can even feel them make time

You can tell by the quiet smooth operation of these C-O Cincinnati 16"-3000 drills that they're really built for accurate work, long hours, and consistently high earnings. High production . . . freedom from vibration and chatter . . . plus the "feel" of a fine tool are the end result of the extra features that make these drills "of outstanding value." And remember, this is just one of many machines available in the complete C-O Cincinnati line to meet all your drilling requirements.

**Accurate, alloy steel spindle,** mounted in a ground steel quill between permanently sealed high-grade ball bearings. Capacities up to 1" in cast iron.

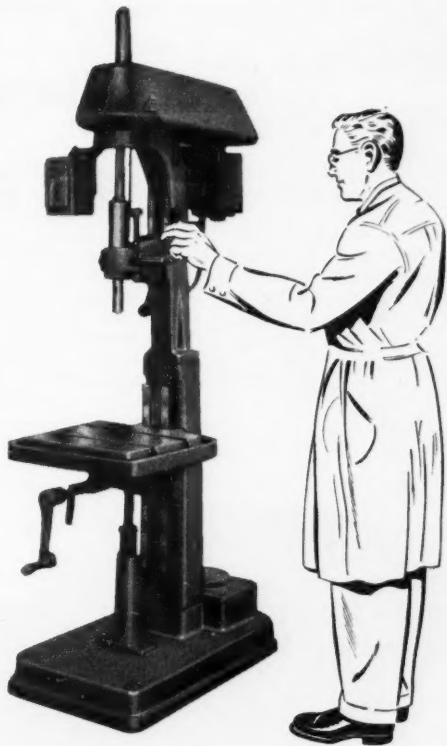
**Full floating drive** transfers all belt pull to two additional ball bearings in the spindle pulley.

**Hand-scraped head ways** cast integrally with the frame provide rigid support for the head. (Counterweight concealed in frame.)

**Tilting motor bracket** permits easy belt shifting for speed changes without wrenches; helps maintain proper belt tension.

**Positive, speedy spindle return** is adjustable to changing job requirements.

Write for Catalog D-108 and the name of your dealer.



CANEDY-OTTO DIVISION

CINCINNATI 9, OHIO, U.S.A.

## cincinnati lathe & tool co.

# 25 years of research

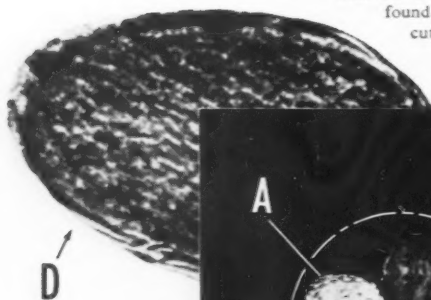
## IN CHIP FORMATION LED TO THE NEW

### CINCINNATI GRINDING WHEELS

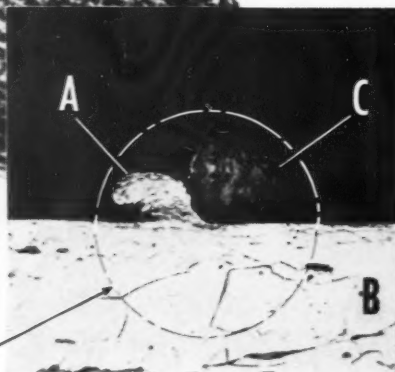
In more than a quarter century of research, it has become increasingly apparent that the grinding process is a true metal cutting process. Cincinnati Milling research has proved that the grinding grits do not abrade or wear away the surface of a workpiece but form chips which agree in classification with the basic chip types found in other metal cutting processes.

The essential factors involved in this vitally important matter of good chip formation are:

1. The tool must be well supported and properly presented to the work.
2. The chip must slide freely up the face of the tool.
3. Heat generated must be kept to a minimum.
4. The heat that is generated must be removed rapidly.

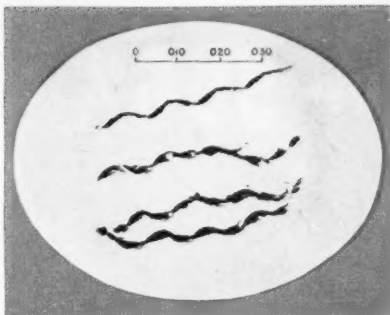


0.0025" dia.

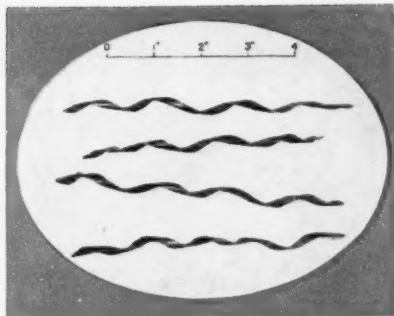


#### "FROZEN ACTION"

Formation of a tiny steel chip by a grinding grit traveling at 6,000 feet per minute. Minute size of chip (A) and grit fragment (C) is indicated by a cross section of human hair (D) photographed at the same magnification—750 times size. Workpiece (B) is SAE 1112 steel.



Type 2 chips obtained from grinding operation on SAE 1112 steel, selected to indicate the free chip formation possible.



Type 2 chips obtained from helical milling operation on SAE 1112 steel. Note similarity in shape to the grinding chips.

Cincinnati Grinding Wheels stem from a frank recognition of these basic facts.

This is the beginning of a whole new approach to grinding wheels—the development of the grinding wheel as a true cutting tool. And it is a development you might expect from Cincinnati Milling, with the

world's largest background of research and experience in metal cutting operations.

For you, this means grinding wheels developed and tested over a period of several years on the basis of true function—as true cutting tools forming true chips.

Available to you is a field or-

ganization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of Cincinnati Grinding Wheels, just write, wire or phone Cincinnati Milling Products Division, The Cincinnati Milling Machine Co.



Type 1 chips obtained from grinding operation on cast iron. Typically discontinuous or segmental.

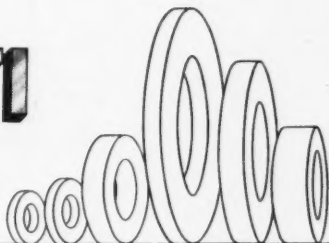


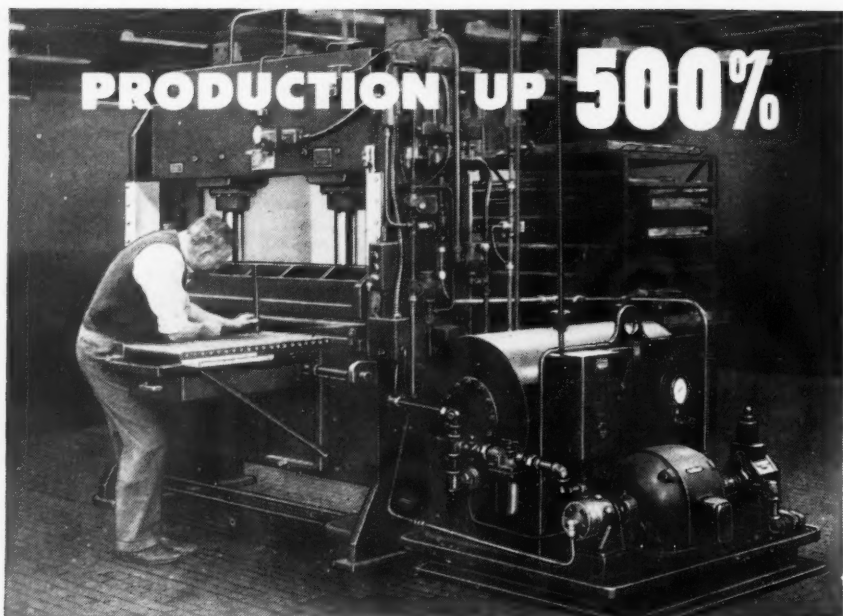
Type 3 chips obtained from slow speed grinding operation on SAE 1112 steel continuous with built-up edge.

**CINCINNATI**  
*Grinding Wheels*

THE CINCINNATI MILLING MACHINE CO.

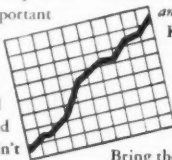
Cincinnati 9, Ohio





## KRW HYDRAULIC PRESS UPS ASSEMBLY OUTPUT 500% AT HOPE'S WINDOWS INC.

The KRW press shown above is curing a big headache! Originally, because of the precise nature of the work, one of the most important assembly jobs at Hope's Windows, Inc., Jamestown, N. Y., was a hand operation. It was slow, painstaking work and held up production of completed Hope's windows. Then the company tried the job on a mechanical press. This didn't work out because the stroke was much too long and, of course, could not be adjusted. Finally, Hope's found the perfect answer to their problem in this 60 ton, 2 cylinder KRW Hydraulic Press.



They set the stroke to 1 1/2" — just what they needed. Result? *Every assembly job is perfect and production has increased five-fold.* The KRW Press cost 2/3 less than the mechanical press that would do the same job — AND the KRW Press can be used extensively for other production jobs through a simple stroke adjustment! Any pressing problems in your work? Bring them to K. R. Wilson for fast, low-cost solution. One, two and three cylinder models; 25 to 150 ton capacities; hand operated, air operated or motor driven. Or, if you need a custom-designed press, we'll build it for you.

For facts, prices and delivery dates see your Machinery dealer or write, wire or phone Dep't. 16

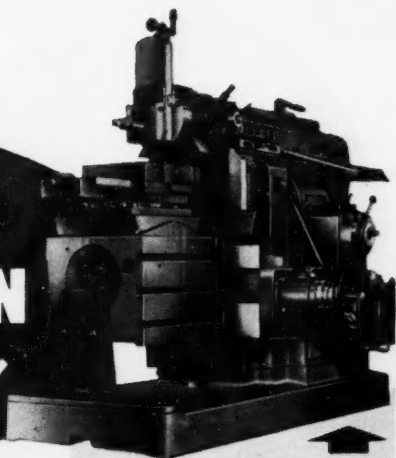


# K · R · WILSON

215 MAIN STREET • BUFFALO 3, N. Y.



**"TODAY...IT'S  
PRODUCTION  
THAT COUNTS"**

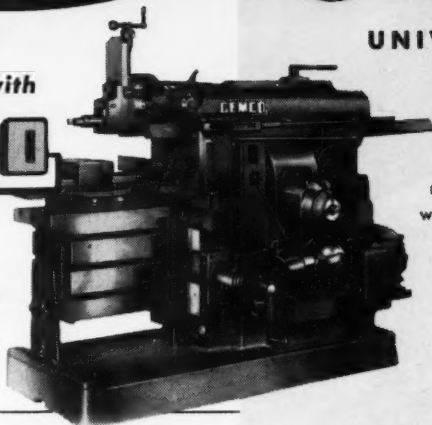


... BEAT COSTLY  
OBsolescence with

**GEMCO**

**PRECISION  
SHAPERS**

SAVE TIME...  
SAVE LABOR...



**UNIVERSAL  
TYPE**

For tool and  
die work and  
general  
machine shop  
work requiring  
frequent  
changes and  
angular set-  
tings. Avail-  
able in sizes  
from 16" to  
36" stroke.

**PRODUCTION TYPE**

For general machine shop use and heavy  
production work. Available in sizes from  
16" to 36" stroke.

**LUBRIGARD PROTECTED**

• **PLAIN TYPE SHAPERS**  
...available only in sizes 16" and 20" stroke



**WRITE FOR BULLETIN**

**LUBRIGARD PROTECTED**

**GEMCO**

**SHAPER Company**

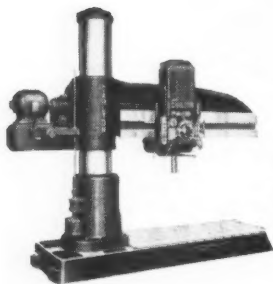
4417 OLEATHA AVE.  
ST. LOUIS 16, MO.

PRECISION MACHINERY SINCE 1917



*Look,  
fellas,  
Two  
hands!*

YES, YOU CAN USE BOTH HANDS WHEN YOU RUN A CARLTON RADIAL DRILL . . . THAT'S THE NATURAL, EFFICIENT PROFITABLE WAY . . . WITH CONTROLS ARRANGED IN LOGICAL, CONVENIENT ORDER ON BOTH SIDES OF THE HEAD . . . CARLTON RADIAL DRILL OPERATORS ACTUALLY DEVELOP "TOUCH SYSTEMS" THAT SAVE TIME AND EFFORT.



You should know more about this ease of operation . . . and the other reasons why Carlton radial drills are frequently able to double hole production. So send today for your descriptive bulletins . . . see how you can make and save money when your operator gets his hands — both hands on that new Carlton.

*Only one can be  
called the finest*

**Carlton**  
THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO

# NORGREN regulator-lubricator setup solves precision control problem on pipe cutter

## CONTINENTAL MACHINE COMPANY

NOT INCORPORATED  
MANUFACTURERS OF  
STEEN HIGH SPEED PIPE & TUBE CUTTER  
SPECIAL MACHINERY  
1952 MAUD AVENUE  
CHICAGO 14, ILL.

C. A. Norgren Company  
Englewood, Colorado

Gentlemen:

### PROBLEM

When we decided to convert the Steen pipe cutting machine to an air operated semi-automatic product, we found that, in order to cut tubing ranging in size from thin wall  $\frac{1}{8}$ " tube thru 12" heavy pipe, we needed extremely close control of the air pressure, as well as smooth travel of the cylinder at all speeds and pressures.

### SOLUTION

After considerable experimentation we decided on the Norgren Lubro Control unit in  $\frac{1}{4}$ " size for our #3 and #6 machine and in  $\frac{1}{2}$ " size for our #12 machine.

### RESULTS

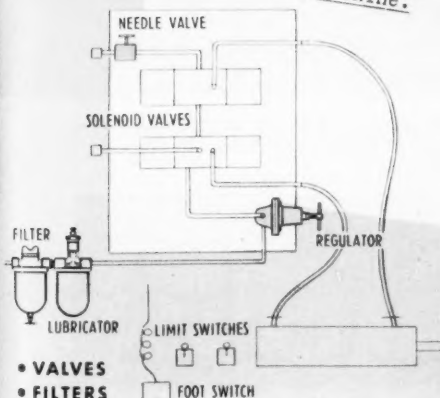
Without the controlled pressure regulation and lubrication provided by the Norgren unit it would be impossible to get the close control needed in the operation of our machine.

Yours very truly,

CONTINENTAL MACHINE COMPANY

*John B. Barten*

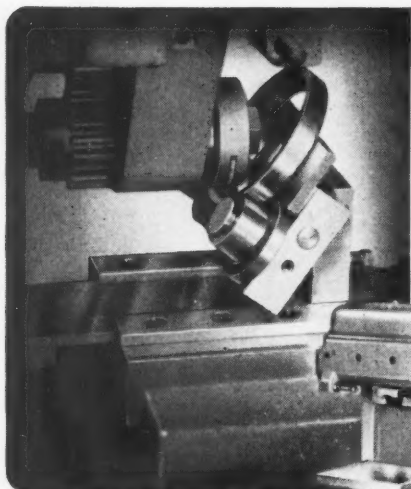
John B. Barten, Partner



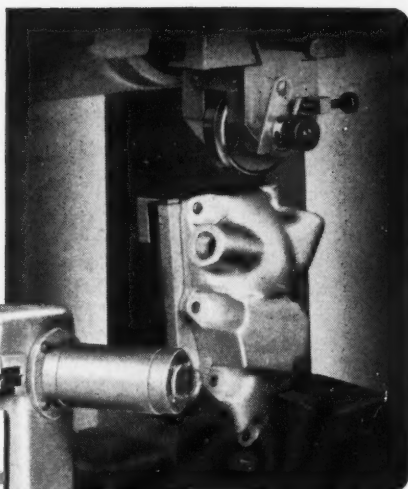
- VALVES
- FILTERS
- REGULATORS
- LUBRICATORS
- HOSE ASSEMBLIES

# Norgren®

3435 S. ELATI ST., ENGLEWOOD,  
IN COLORFUL COLORADO



Above left—Tooled for marking part numbers on the I.D. of steel rings—component parts for aircraft engines.



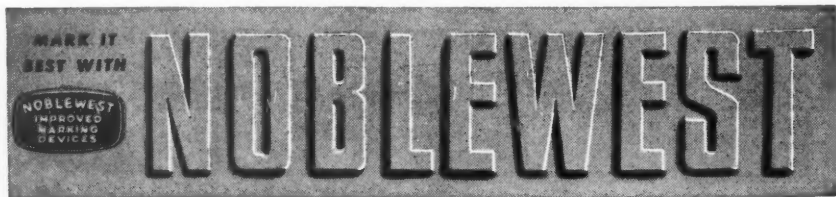
Above right—Tooled for marking aircraft engine rocker box covers.

## ROLL-O-MARK'S Versatility

All-pneumatic Model 50P1

*Speeds up  
metal marking  
for  
defense  
production*

It will pay you, as it has hundreds of other manufacturers, to put your marking problems up to Noble & Westbrook Mfg. Co., 25 Westbrook Street, East Hartford 8, Conn. Complete catalog sent upon request.

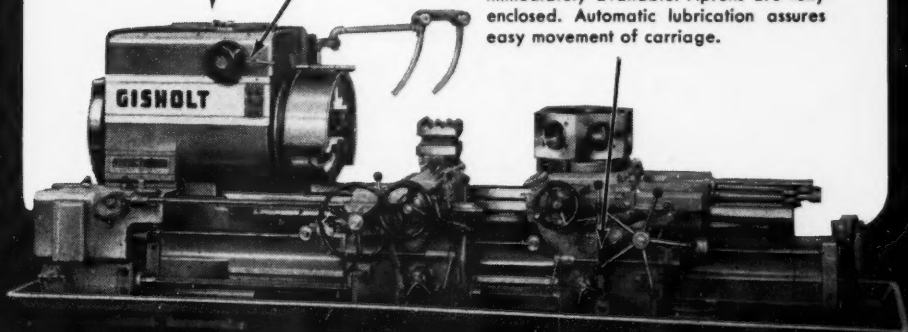


# GISHOLT'S *easier operation* saves you time and money...



This 21,000 lb. machine requires no more operating effort than turret lathes  $\frac{1}{3}$  its weight. Despite its great power and rigidity for heavy-duty work, the new Gisholt 4-L is so fast and responsive, it can handle light work of both large and small diameters. With many machine functions entirely automatic, waste time is eliminated. Fatigue is reduced to a new minimum. Training time is shortened. Operator output is faster—more nearly constant throughout the day.

- 1** Hydraulic Speed Selector eliminates manual gear shifting. Spindle speed changes are made instantly by power without stopping the spindle or releasing the main drive clutch. Can be operated either direct or pre-set.
- 2** Central control panel eliminates manual effort. Provides responsive finger-tip, push-button control for start, stop, reverse, inching, chucking, and coolant supply. Automatic braking brings the work smoothly and quickly to rest.
- 3** Easy selection of feeds is provided in the new single dial type feed selector control, making a complete choice of feeds immediately available. Aprons are fully enclosed. Automatic lubrication assures easy movement of carriage.



The new Gisholt 4-L Saddle Type Turret Lathe provides  $31\frac{3}{8}$ " swing over the ways, 27" swing over carriage wing,  $9\frac{1}{2}$ " to  $12\frac{1}{2}$ " spindle bores and 63" longitudinal working travel of turret carriage to accommodate an unusually wide range of work. Ask Gisholt engineers about this modern, easier operating Gisholt as applied to your specific machining requirements. New literature is available.

# GISHOLT

MACHINE COMPANY

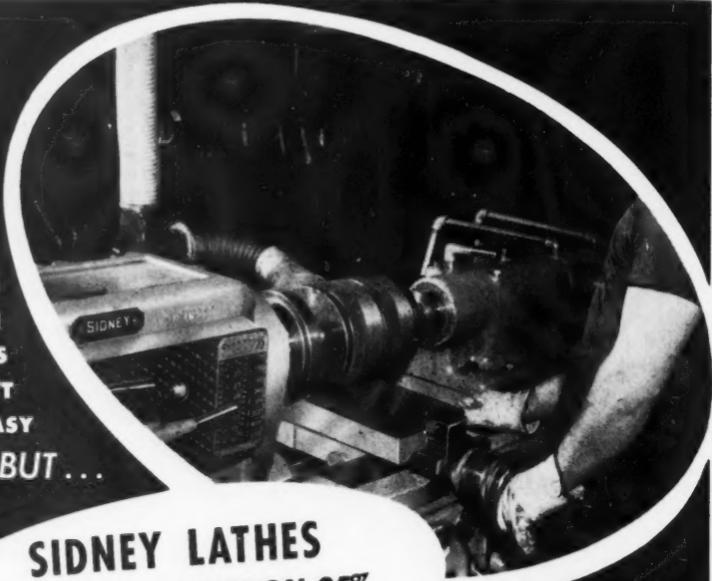


Madison 10, Wisconsin

**THE GISHOLT ROUND TABLE**  
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

**FORM  
TURNING  
PISTON  
RINGS  
ISN'T  
EASY  
BUT...**



**SIDNEY LATHES  
INCREASED PRODUCTION 25%  
AND IMPROVED QUALITY FOR  
PERFECT CIRCLE**

When you consider the millions and millions of piston rings produced by PERFECT CIRCLE you can understand what a 25% increase can mean in the total output. And think also of the infinite precision necessary to achieve the required smoothness on which so much depends.

**SIDNEY LATHE'S HERRINGBONE GEARS ELIMINATE TOOTH MARKS**

**Here's What PERFECT CIRCLE says about SIDNEY LATHES:**

"Your Sidney Lathes were built with special attachments for irregular inner diameter boring and outer diameter contour turning and slitting. Production of surface feet per minute increased about 25%. At the same time the quality of the product was improved because of the ability of the Sidney equipment to hold closer tolerances. These factors resulted in increased production per man hour, improved quality and enabled PERFECT CIRCLE to meet delivery dates."

**PUT YOUR PROBLEM UP TO SIDNEY . . . WE'LL HELP SOLVE IT.**

*Write for details or contact nearest Sidney representative*



**SIDNEY MACHINE TOOL COMPANY • SIDNEY, OHIO**

**BUILDERS OF PRECISION MACHINERY SINCE 1904**



## for Lower Costs !

Take a tip from hundreds of plants all over the country. Stop using old-fashioned cutting fluids. Go Cimcool®, the radically new and different cutting fluid that does a better job and saves you money in three important ways:

- **CIMCOOL INCREASES TOOL LIFE** (and thus reduces down time) because of its chemical lubricity.
- **FASTER SPEEDS** are possible because Cimcool cools faster, through a unique physical change in the cutting fluid itself. Tools and chips actually stay cool to the touch.
- **CIMCOOL COSTS LESS** than old-

fashioned cutting fluids because it lasts longer. It also cuts labor costs for cleaning and changing. It virtually eliminates rancidity and foul odors. And because of its low surface tension and low adhesion to work and chips, there is practically no carry off.

For a demonstration in one of your own machines, just write us. We'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet, "CIMCOOL Defeats Heat." Address, Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

®Trade Mark Reg. U.S. Pat. Off.

**A Production-Proved  
Product of**  
THE CINCINNATI MILLING  
MACHINE CO.

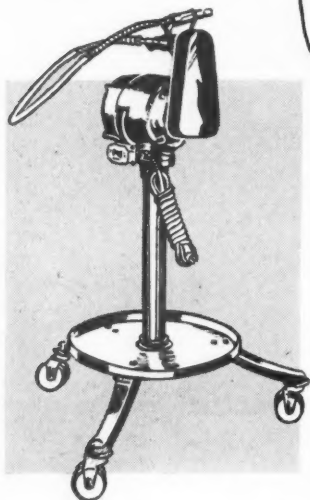


*for*

**85%**

**OF ALL METAL CUTTING JOBS**

# START



of a perfect  
**FINISH!**  
with  
***haskins***  
**FLEXIBLE SHAFT TOOLS**

### SEND FOR BULLETINS!

Complete bulletins and operating data are quickly available. Send today, stating your particular production problem. Use the Coupon.

Whether you're finishing a casting, a weld, a fine die or stainless steel surface, you'll get the equipment that will do the job best from the best-known name in flexible shaft equipment—Haskins. Here is a company with a world of finishing experience to offer you—and a line of flexible shaft equipment in which long-life, multiple usefulness and economy have never been sacrificed to price.

**R. G. HASKINS COMPANY 2647 W. Harrison St., Chicago, Ill.**

Send data on Haskins equipment for \_\_\_\_\_  
(state operation)

Name \_\_\_\_\_

Firm Name \_\_\_\_\_

Street address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_

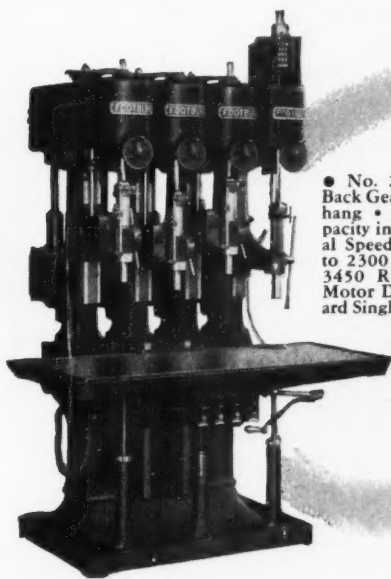
# faster for tool room or assembly line

• The choice of fine machine tools now will help you meet those new production schedules. Footburt Sensatives are built with the wide range of speeds and with power and sturdiness to drive cutting tools to their full capacity. They are built with the care and precision that will keep them accurate over a long period.

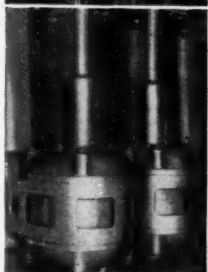
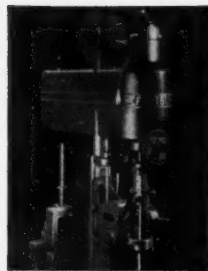
Write, wire or phone for prices and delivery information.

**THE FOOTE-BURT COMPANY • Cleveland 8, Ohio**

Detroit Office: General Motors Building



• No. 2 Machine with Back Gear • 12" Overhang •  $\frac{3}{8}$ " Drilling Capacity in Steel • Optional Speed Ranges • 185 to 2300 RPM • 280 to 3450 RPM • Vertical Motor Drive with Standard Single Speed Motor • Power Feed Assembly • Tapping Attachment • Coolant Outfit.



# FOOTBURT

*machine tools*

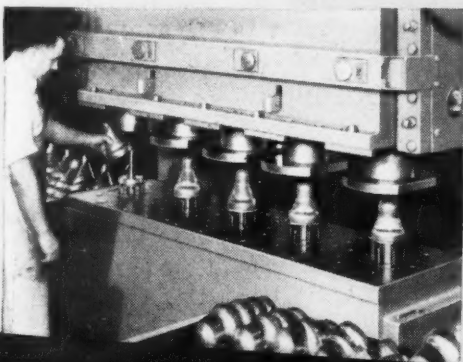
# NIAGARA

## SERIES B GAP FRAME Double Crank Presses

Niagara B-4 x 72 Press at the General Machine Works in Los Angeles. It is shown here fitted with two dies for forming operations on an automatic deflector.



The same press as shown above arranged with dies for redrawing projectile parts in 5 steps. Shells are transferred manually from die to die.



**NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.**

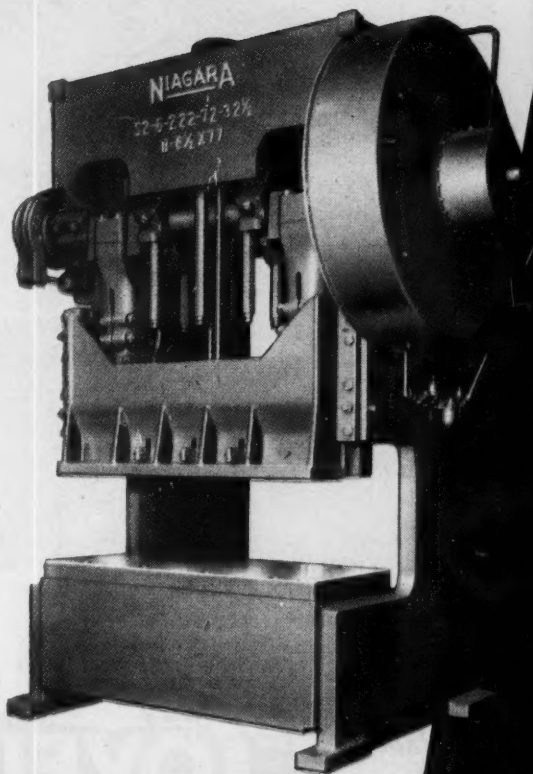
\* Manufacturers of a complete line of sheet metal working equipment ranging from small hand tools up to large power operated machinery.

# Versatility and High Production

- Gap frame convenience with double crank width.
- Ideal for long progressive dies or multi-station dies.
- Rear of press open for full accessibility.
- One piece welded steel frame for maximum rigidity and long die life.
- Exclusive Niagara Sleeve Clutches for maximum productive strokes per minute and minimum maintenance cost.
- Niagara cushions for drawing operations.
- Automatic feeds for high production jobs.

*Write for Bulletin*

Niagara B-6½ x 77 Gap Frame Double Crank Press. Air actuated, electrically controlled sleeve clutch with friction clutch convenience and sleeve clutch economy. Air releasing brake. Clutch and gearing operating in a bath of oil. Air counterbalance for slide with surge tank over-size cylinder and pressure regulating valve to compensate for various weights of dies. Cross bar knockout in slide. V-belt motor drive.



DISTRICT OFFICES: NEW YORK • CLEVELAND • DETROIT • PHILADELPHIA

# Here's HIGH SPEED — HYDRAULIC FEED — PRECISION PLUS!

**PROMPT  
DELIVERIES FOR  
DEFENSE**

*in  
these* **COVEL**

**SURFACE GRINDERS**



★ Ball bearing spindle — cartridge type sealed and lubricated for life.

★ Table speeds variable from 10' to 90' per minute.

★ Anti-friction ball or roller bearings used throughout.

★ Hardened and ground cross feed and elevating screws.

★ Hard chrome table ways for extra long life.

★ Trouble-free low-pressure hydraulic system used throughout.

	No. 20	No. 35
Work capacity	6" x 18"	8" x 24"
Transverse table travel	6¾"	9"
Longitudinal table travel	20"	27"
Grinding wheel size	10"	12"
Capacity under wheel	12"	11"

*Builders of Precision*

*Grinders for 78 Years*

*Write  
for  
BULLETIN  
MM-92*

**COVEL PRECISION GRINDERS**

**BENTON HARBOR — MICHIGAN**

— DRILL GRINDERS — UNIVERSAL CUTTER & TOOL GRINDERS —  
HYDRAULIC & HAND FEED SURFACE GRINDERS



### ***Measure with Confidence with Tumico***

There was a time when "hair-line" accuracy was industry's critical standard of measurement. Today, Tumico instruments divide and redivide that mythical "hair-line" many times.

Tumico precision measuring tools are being used by a large segment of American industry. We cordially invite your inquiries on how to solve standard and special production measuring problems.

**TUBULAR**



**MICROMETER CO.**

ST. JAMES, MINNESOTA

# CONVERTICAL QUILL TRAVEL MILL ATTACHMENT



**\$245<sup>00</sup>**

COMPLETE  
WITH MOTOR  
FOB Chicago

High speed, medium and light  
operation made for  
Bench, Floor and Pedestal Mills.

*New!*

PRECISION MADE BY

**RUSNOK**

ONLY LOW COST  
QUILL TRAVEL ATTACHMENT

**MILLING**

**DRILLING BORING**

- Quill travel 1½"
- Five spindle speeds  
380, 700, 1200, 2500, 5200 RPM
- Micrometer depth stop
- Positive Quill lock
- Forward, stop, reverse control

- Angular settings, single  
and compound
- Full use of table travel
- Time-saving settings
- Quick, easy speed change
- Light, efficient rigid

WRITE TO

TOOL

**RUSNOK**

FOR BULLETIN C

WORKS

4840 W. North Ave.

Chicago 39, Illinois

*Specify*

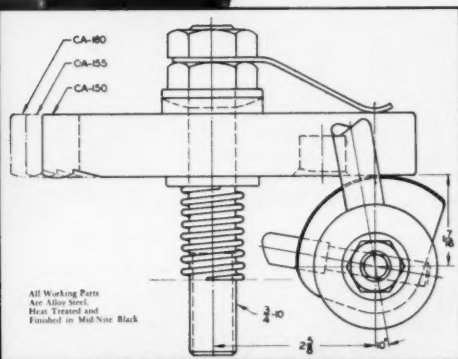
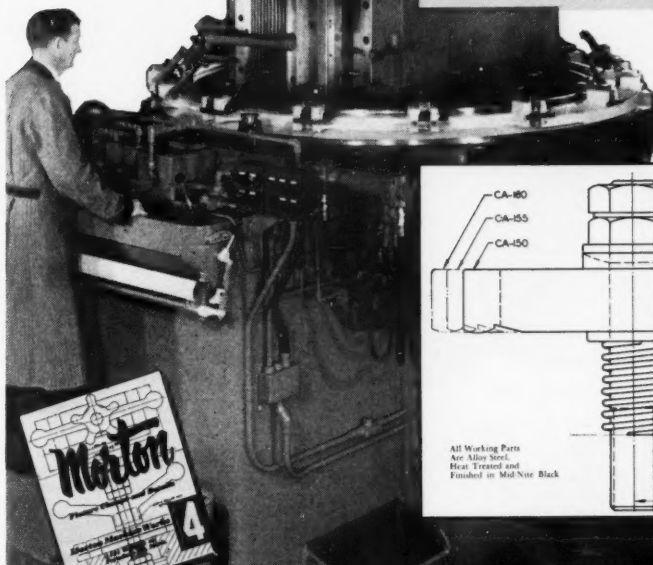
**Morton**

**MORTON'S  
PRODUCTS  
were used  
on this  
difficult  
job.**

**YOU, TOO, CAN BE PROUD  
OF YOUR  
PRODUCTION RECORD!**

## **FIXTURE CLAMPS and COMPONENTS**

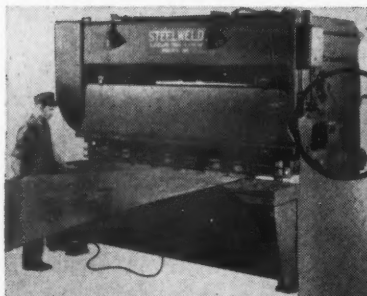
When confronted with a problem considered impossible by the experts, Mr. Andrew C. Dickson, General Superintendent of Mfg., Detroit Tank Arsenal, and Staff, together with the "Know-How" of Colonial Broach Engineering Staff solved it, resulting in a \$400 a day saving. Fully described in March 3 issue of American Machinist.



Write for Catalog of most complete line in the industry. Full size tracing templates of each product. Economize with MORTON.

# **MORTON MACHINE WORKS**

2421 WOLCOTT STREET • DETROIT 20, MICHIGAN



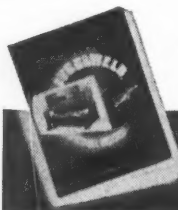
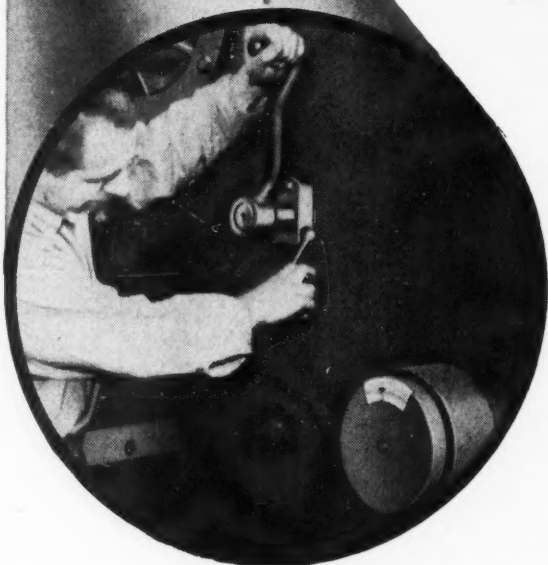
## THE *Right* KNIFE CLEARANCE FOR EVERY PLATE THICKNESS

### ONLY STEELWELD SHEARS HAVE THIS SIMPLE KNIFE ADJUSTMENT

It is simple, fast and easy to adjust the knife clearance on a Steelweld Pivoted-Blade Shear to suit every plate thickness. No bolts to loosen! No bed to move! No feeler gauges required!

Only turn a crank and watch a dial. That's all there is to it. The large easily-read dial indicates the clearance between knives in thousandths of an inch and also shows the plate thickness that may be cut with any knife setting. Because of the ease with which knife adjustments are made, every cut made on Steelweld Shears is the best cut possible—straight, smooth, accurate. And of importance, knives remain sharper for longer periods.

Steelweld Shears are built for thicknesses of 12 gauge to 1½ inch and for lengths of 6 to 18 feet.



#### GET THIS BOOK!

CATALOG No. 3011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.  
6411 EAST 282nd STREET • WICKLIFFE, OHIO

# STEELWELD PIVOTED BLADE SHEARS



## UNPARALLELED GRIP from parallel jaws

*Latest And Greatest In Collet Design!* Tool engineers and machine tool builders praise the Jacobs Rubber-Flex Collet as one of the outstanding developments in modern tool history. This new principle of collet construction brings you not only great improvements in gripping power, accuracy, and service life, but — *for the first time* — a collet with a full  $\frac{1}{8}$  inch capacity range.

Jacobs Chucks are stocked and sold by your Industrial Supply Distributor.

The Jacobs Manufacturing Company, West Hartford 10, Conn.



*The Rubber-Flex Collet, previously available in Jacobs Tap and Drill Chucks, is now offered in our popular Spindle Nose Lathe Collet Chuck — offering features never before obtainable in a nose type Lathe Collet Chuck.*

IF IT'S A  
**JACOBS**  
IT HOLDS

# HERE'S EVERYTHING FOR PRECISION BORING and INTERNAL THREADING

## HIGH SPEED STEEL TOOLS

If you want precision in boring as well as speed, use Bokum Boring Tools.

Most remarkable production records are being achieved with these tools. Due to the unique design—a helical back-off—the tools provide constant clearance and permit faster machine operation.

Resharpening is done on one face only. Accomplished quickly and precisely.

Anything you need for boring is at Bokum's—tools and accessories. Yes, answers to your boring problems, too. Let us help you.

## CARBIDE-TIPPED TOOLS

## SOLID CARBIDE TOOLS



TRADE MARK REG. U. S. PAT. OFF.

# BOKUM TOOL CO.

SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

DEPT. H • 14775 WILDEMERE AVE. • DETROIT 21, MICH.

# NEW JONES & LAMSON UNIVERSAL BENCH TYPE CHASER SHARPENING MACHINE

Specifically designed to resharpen chasers, this *Low Cost*, space saving machine allows you to free heavy expensive machine tools for their intended uses, and at the same time do a better job of chaser sharpening. *It's good for miscellaneous small tool and cutter grinding too.*



J&L Universal Grinding Fixture with tangent chaser. Basic fixture has provision for mounting wheel dressing diamond.

Extra grinding wheel with tool rest for miscellaneous grinding.

110 Volt reversible motor for RH or LH chaser grinding.

Graduated micrometer dial to control infeed.

Grinder set up to resharpen J&L Tangent chasers

**Universal Application** Equipped with the new J & L chaser grinding fixture and adapters, an outstanding job will be done on all sharpening operations, for both tangent and radial die chasers. Adapters for J & L chasers available from stock. Adapters for other chasers can easily be applied to the chaser grinding fixture.

**Repetitive Accuracy** This machine will duplicate desired grinds repeatedly. It is a precision machine tool equipped with all necessary stops and controls.

**Easy to Operate** Simple, direct methods speed up the operation and cut costs. Even an inexperienced operator can, in a few minutes, learn to resharpen chasers on this machine.

**Saves Space** BENCH SPACE 14 x 28 inches is ample for your complete chaser resharpening operation.

**Low Cost** This complete unit, designed to do your entire chaser resharpening job, sells for only a small fraction of the cost of other bulkier machines often used. Why not install one in your plant, and release your heavier, bulkier machines for their intended uses?



Because of its size this machine can well be a time saver in shops where cutter grinding rooms are at distant points from the machines where dies are used. Write Dept. 710G for further details.

## JONES & LAMSON

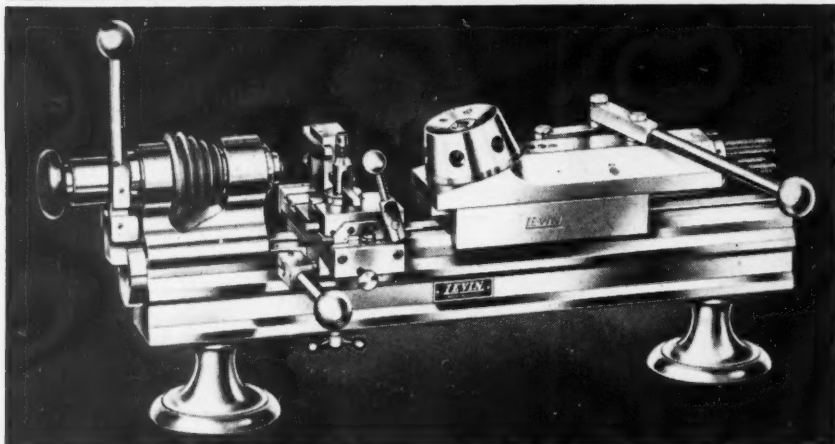
JONES & LAMSON MACHINE CO., Springfield, Vt., U.S.A. Dept. 710



Machine Tool Craftsmen  
Since 1835

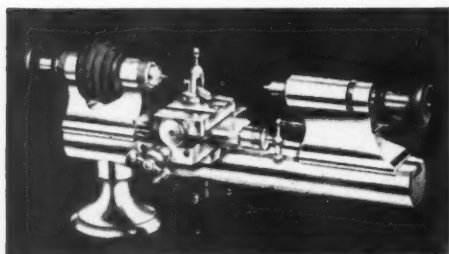
**DIE HEAD DIVISION**

# **LEVIN** INTRODUCES A JEWELER'S TYPE <sup>®</sup> **BENCH TURRET LATHE**

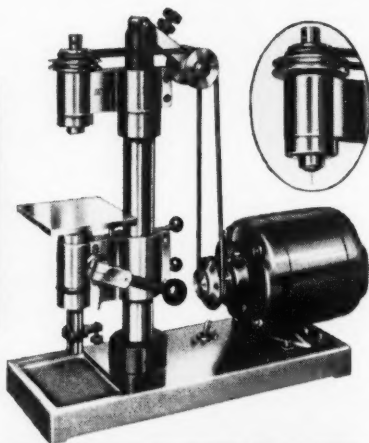


A small sensitive turret lathe for instrument parts and second operation work. Swing 4", bed 18", collet capacity  $\frac{3}{16}$ " or  $\frac{5}{16}$ "; self indexing, 6 position turret with  $\frac{1}{2}$ " holes and hardened slide ways.

Write for catalog listing turret lathes, turret tools and other models of lathes.



Micro-drill press for small hole drilling. Sensitive spindle holds small drills in TRUE collets ...Immediate Delivery!



**LOUIS LEVIN & SON INC., 782 E. PICO BLVD., LOS ANGELES**

# SPEEDY AIR VISE

**SPEEDS UP**

✓ MILLING

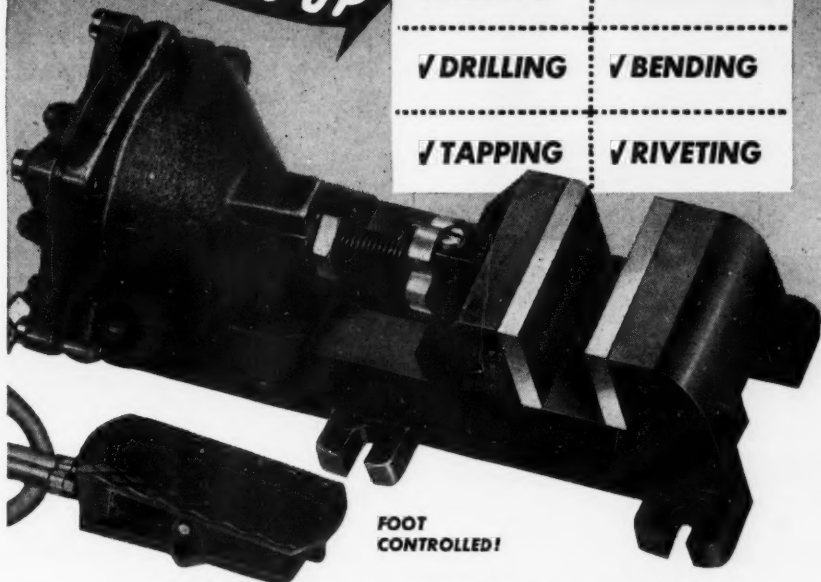
✓ PUNCHING

✓ DRILLING

✓ BENDING

✓ TAPPING

✓ RIVETING



**FOOT  
CONTROLLED!**

## GRIPPING FORCE 15 TIMES AIR LINE PRESSURE

Speedy Air Vise helps you do dozens of operations faster, better, cheaper—by air pressure! Foot control valve opens and shuts vise instantly, leaving *both* hands free to produce *more!* Jaw opens up to 3 inches, holds castings, parts, jigs, etc. Compact, trouble-free, inexpensive.

Complete with Foot Control Valve, Air Hose and Fittings . . . only **\$29.90**

ORDER FROM YOUR MILL SUPPLY DEALER OR WRITE DIRECT



### AIR REGULATOR

Precision - built.  
Delivers pressures  
up to 140 lbs. With  
gauge, \$4.95  
Less gauge,

**\$2.75**



### AIR FILTER

Keeps water  
and particles  
out of the  
regulator and  
pneumatic  
tools. **\$2.15**

### BLOW-GUN

Looks and  
operates  
like a gun. Ideal for  
cleaning and blowing  
out chips, dust, filings,  
scraps, etc. . . **\$3.00**



**W. R. BROWN CORP. • 2649 N. NORMANDY AVE. • CHICAGO 35, ILL.**

# Only **DIMENSIONAIR** Gives You All This

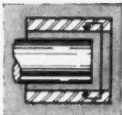


**FULL 7 1/2" SCALE OF CALIBRATED ACCURACY**

**All of it measures accurately.  
Not just part of it!**

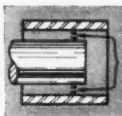
## **LONGER APPROACH RANGE**

You measure earlier **BEFORE** reaching minimum work size. Less scrap. Same plug used on both rough and finished dimension. Total minus range .0015".



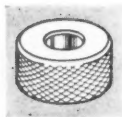
## **GREATER CLEARANCE (.0018" up to .0038")**

You can read Undersize, Taper, Out-of-Round and Irregular Shape Holes without plug getting stuck. Easier to insert plug.



## **STAY-PUT ZERO — DON'T WORRY ABOUT PRESSURE FLUCTUATIONS**

They do not affect accuracy. Set zero when you start—that's all. No drifting. Full Jeweled Cushioned Movement — more sensitive to size variations.



## **ONE MASTER ONLY — FORGET THE IDEA TWO ARE NEEDED**

Only air gage with enough precision to permit use of only one master. Interchangeable plugs — every plug calibrates on same scale.



## **LONGER PLUG WEAR — JET FACES ARE DEEPER**

Saves you real money.

## **10 SECOND SET-UP — JUST ONE ADJUSTMENT**

As simple as setting a Dial Indicator. Direct and Positive.

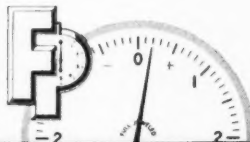


## **Try it — and prove it to yourself**

Only the Dimensionair provides the many important features above. Customers who have given the Dimensionair a thorough trial have found its advantages outstanding and have ordered many Dimensionairs in large quantities, and repeatedly. We invite you to try the Federal Dimensionair and compare it with any other air gage. Ask our nearest representative or write today for complete information and prices. **FEDERAL PRODUCTS CORPORATION, 1149 Eddy Street, Providence 1, R. I.**

# FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing all types of **DIMENSIONAL INDICATING GAGES**



have you heard this

## TURBINE WHEEL STORY

It's a matter of design and engineering  
... and it's all in the *interchangeable fixture!*

### TWO TURBINE WHEELS

- ✓ with different diameters
  - ✓ with 8-branch and 4-branch "pine tree" slots
- BROACHED WITH THE SAME BROACH!**

Here's an instance where **LAPOINTE** engineering resulted in the saving of time and money, tools and machines.

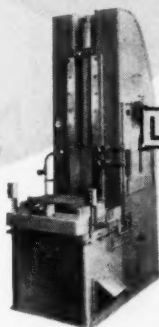
Because this jet engine manufacturer required *two sizes* of turbine supercharger shaft assemblies, we designed the slot so the *same broach* could serve for both diameter wheels. For the larger wheel, all four "pine tree" branches are used; for the smaller wheel only three are used.

*The interchangeable fixture* makes it possible to broach both wheels on the same machine, with the same broach!



**50** YEARS IN BROACHING!  
We're the oldest in the world!  
1902 • GOLDEN ANNIVERSARY • 1952

**LAPOINTE ENGINEERING** can help you in all your broaching problems. Fifty years of experience in building broaching machines, broaching tools, and fixtures can be placed at your disposal promptly ... on request.



**LAPOINTE**

Single Ram  
Vertical  
**BROACHING  
MACHINE**

Available in  
several sizes  
and capacities.  
Fully described  
in our Bulletin  
SRV-8.

Write for it.

THE

**LAPOINTE**

**MACHINE TOOL COMPANY**

HUDSON, MASSACHUSETTS • U. S. A.  
Branch Factory: Watford, Herts., England

HUDSON  
**LAPOINTE**  
MASS

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES



**So You Want to Make a MILLION?**

*... then follow this procedure*



①  
②  
③

Get CARMET carbide metal dies and equip your presses with them.

Make 1,000,000 small stampings a day with only *one* grind per day.

Save \$56,907 annually by using Carmet, as shown in the following cost comparison:

WITH CARMET	WITH HI-CARBON, HI-CHROME
★ 4½ Dies per year.....\$30,600	★ 22 Dies per year.....\$ 46,750
★ Punch Replacements per year.....\$(none)	★ Punch Replacements per year.....\$ 6,600
★ 260 Grinds per year.....\$14,560	★ 4,420 Grinds per year.....\$ 47,424
★ Diamond Wheel Cost per year.....\$ 792	★ Abrasive Wheel Cost per year.....\$ 2,085
ANNUAL COST WITH CARBIDE.....\$45,952	ANNUAL COST WITH FERROUS...\$102,859

④

Make millions *more* precision pieces a year than you could with hi-carbon, hi-chrome dies!

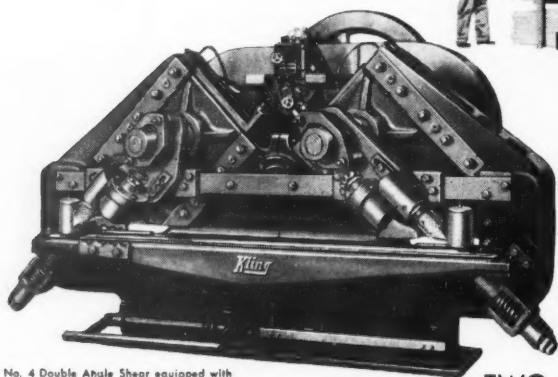
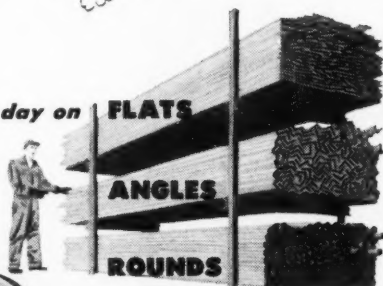
Ask the Carmet representative to figure out the potential savings and increased production for you in terms of your own work. • Allegheny Ludlum Steel Corporation, Carmet Division, Wanda & Jarvis Avenues, Detroit 20, Michigan.



For complete **MODERN** Tooling, call  
**Allegheny Ludlum**  
WAD 4086

# It's the **BUSIEST** machine in the shop!

...gives more cuts per day on



No. 4 Double Angle Shear equipped with Automatic Lubrication System, Gear Guards and Automatic Hold-downs.

**Kling**  
**double**  
**angle**  
**shears**

**TWO shears in ONE machine!**

If you're using obsolete, slow-poke methods of shearing, the Kling Double Angle Shear can help you save time and money. This modern compact machine is designed for high speed, high production shearing on both long and short run jobs. Many metal fabricating plants and steel warehouses have found the Kling Shear to be the workhorse of the shop. For instance, one machine will shear round bars and bar angles on the left side while the right side can be used for structural angles and flat bars. The machine is built with the speed and power to handle the bulk of your shearing requirements. For shops with considerable mitre shearing

work, Kling Double Angle Shears can be mounted on a turntable to facilitate handling. Automatic hold downs and one-shot lubrication can be furnished when desired. Sizes to handle angles up to 8" x 8" x 1 1/2"

#### WANT TO CUT SHEARING COSTS?

Find out how this high-production machine, available in four sizes, can give you more cuts, cleaner cuts on your shearing operations. Write for more information and latest bulletin. Kling Bros. Engineering Works, 1328 North Kostner Avenue, Chicago 51, Illinois.

SEND FOR NEW BULLETIN 2345

5808MMR

in our  
60th  
Year

**Kling**

...an investment in speed!



Friction Saws



Combination Shear  
Punch & Cutter



Roller Shear



Punches



Plate Bending Roll

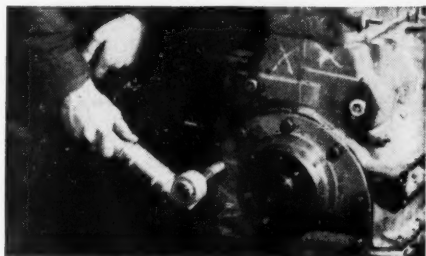
# "...because Buckeye Tools stand up better"

A West Coast manufacturer of truck and bus engines buys portable air tools solely on the basis of performance—and uses Buckeye wrenches, grinders and drills in production and assembly work. In placing a recent order for Buckeye drills, the plant engineer said, "We use a lot of air tools here and have found over a period of years that Buckeye tools give us less trouble and stand up better."

Buying air tools on the basis of performance alone is simply good business — particularly when you can test Buckeye tools in your own plant, on your job, without obligation. Write today for your copy of our Air Tools catalog—and start now to save time and money with Buckeye tools.



Buckeye "B" Series grinder removing burrs from flywheel housing for bus engine.



Running in cap screws on a truck engine takes less time with this Buckeye "B" Series wrench. Buckeye "C" Series right angle wrenches are also used for this type of work.

## Buckeye Tools

CORPORATION

DIVISION 17 • DAYTON 1, OHIO

IN CANADA: Joy Manufacturing Co. (Canada)  
Ltd., Galt, Ontario

PORTABLE AIR AND ELECTRIC TOOLS FOR INDUSTRY

# Lee-Rowan switches to 3M Belts for higher polish on metal hangers



**PRODUCTION PROBLEM:** Reduce finishing costs . . . produce a higher polish on product. Manufacturer was using costly, troublesome set-up wheels. Finish was unsatisfactory.

**3M RECOMMENDATION:** Switch to 3M Abrasive Belts and a swift 3-step operation: one pass on a No. 180 Belt, one pass on a No. 240 Belt and a final pass on a greased No. 240 Belt using a Buff Contact Wheel.

**THE RESULTS:** This speeded-up finishing method is currently producing a highly polished hanger—with greatly reduced abrasive costs. Process is easier and safer for operator.

Let a 3M Methods Engineer analyze your abrasive requirements and recommend how you can cut costs, step up production through the use of 3M abrasives.



Minnesota Mining & Mfg. Co.  
Dept. MMS-952, St. Paul 6, Minn.  
Please send me free booklet  
STEP UP PRODUCTION

Name

Company

Address

City  Zone  State



Made in U.S.A. by  
**MINNESOTA MINING & MFG. CO.**  
General Offices: Saint Paul 6, Minn.  
In Canada: London, Ont., Can.  
Export: 122 E. 42nd St., New York City.

Makers of: "SCOTCH"® Pressure-Sensitive Tapes • "SCOTCH"® Sound Recording Tape  
"3M"® Adhesives • "UNDERSEAL"® Rubberized Coating  
"SCOTCHLITE"® Reflective Sheeting • "SAFETY-WALK"® Non-Slip Surfacing



# Now a long-wearing GUIDE-PIN BUSHING

that

WON'T SEIZE  
OR SCORE



**HARDENED STEEL**

**BRONZE-PLATED**

PATENT PENDING

Lamina Guide-Pin Bushings combine the long wearing of hardened steel with the free, smooth glide of bronze. No more seizing or scoring from hardened steel running on hardened steel . . . no more out-of-round wear characteristic of soft non-ferrous bushings . . . Lamina Bushings provide the answer to long, seize-free bushing service in punch and die shoes.

Lamina Guide Bushings are made of hardened steel with .001" to .002" of bronze electro-plated on the inside diameter. In addition to this, an oil groove,  $\frac{3}{16}$ " wide is machined into the

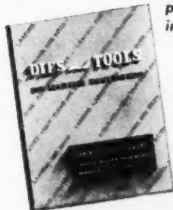
inside wall in a figure eight pattern. Each bushing is furnished with an alemite fitting for lubrication of the oil groove.

In actual use on hundreds of Lamina-built dies, in laboratory tests under conditions far more severe than shop conditions, these bushings without exception have proven absolutely trouble-free in service.

Stocked in a variety of sizes and lengths for straight pins, shoulder pins or removable pins. Specials made to order. Lamina Dies & Tools, Inc., 14925 W. Eleven Mile Road, Berkley, Michigan.

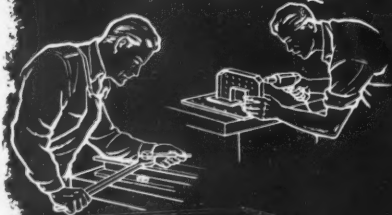
FREE  
BULLETIN

Send for Lamina bulletin which gives full details and dimensions on Lamina Guide Bushings. Also contains information on a variety of other Lamina tools, dies and job proven die making equipment.

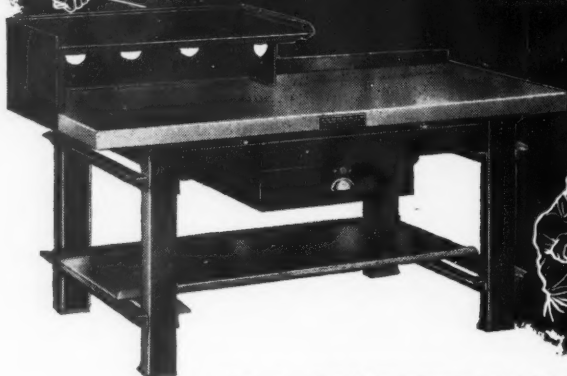


*Lamina*  
**DIES AND TOOLS**

VALUABLE EQUIPMENT IN ANY SHOP



## HEAVY DUTY CHALLENGE WORK BENCHES



### IN A COMPLETE RANGE OF SIZES

These strong, rugged . . . and accurate-top work benches have no equal when it comes to providing facilities for work-handling. Each bench comes complete with tool box shelf . . . lock-leveling screws . . . guard rail . . . roomy steel drawer with lock . . . and a convenient storage shelf. Cast-iron top 2" thick.



#### NEW! LOW-COST CHALLENGE UTILITY BENCH

Simple in design . . . rugged in construction, this plain Utility Bench has many uses! It's heavily ribbed, 24x36" cast-iron top . . . supported by sturdily braced steel legs . . . provides an inexpensive working surface. No "frills" to increase price. Size: 36" high . . . or 30" high as nailing table. Write for details.

707

## THE CHALLENGE MACHINERY COMPANY

Office, Factories  
and Show Room:

Challenge  
TRADE-MARK ®

Grand Haven,  
Michigan

## Use S.S.White flexible shafts

*to drive parts  
that travel in operation*



● Shown here is a type of application to which S.S.White flexible shafts can readily be adapted. In this hypothetical case, a mechanically driven cutter is designed to traverse on a lead screw. The problem of driving the cutter from a remote take-off is simply and easily solved with an S.S.White flexible shaft. Besides providing a dependable, positive drive, the shaft readily adapts itself to any operating position.

When you design drives for parts that travel in operation—such as instruments, cutters or counting devices—consider using S.S.White flexible shafts. They're "naturals" for jobs such as this.

### IDEAS FOR YOU!

*This 256-Page Flexible Shaft Handbook tells the complete flexible shaft story. Copy sent free if you request it on your business letterhead.*



**THE *S.S.White* INDUSTRIAL DIVISION**  
**DENTAL MFG. CO.**



Dept. 5, 10 East 40th St.  
NEW YORK 16, N. Y.

WESTERN DISTRICT OFFICE

• TIMES BUILDING

• LONG BEACH, CALIFORNIA

September, 1952

MODERN MACHINE SHOP 101



*Survey by Leading Motor Manufacturer Proves*

## **NORMA-HOFFMANN *Prelubricated* "CARTRIDGE" BEARINGS**



A recent survey of over 131,626 A-C motors shows the use of "Cartridge" Prelubricated bearings saved a yearly average cost of \$270.00 per hundred motors by eliminating periodic relubrication.

In addition to this \$270.00 saving, motors using "Cartridge" bearings showed an indicated saving of \$480.00 by reducing motor outage, lost machine time and man-hours.

A total yearly saving of \$750.00 per hundred motors! You, as a manufacturer of motors, machine tools, pumps or other machinery can pass these savings to your customers by using Norma-Hoffmann "Cartridge" Ball Bearings. How — because these patented bearings require no periodic relubrication.

Made to double-row width, Norma-Hoffmann "Cartridge" single-row ball bearings have 100% more grease capacity than conventional width sealed bearings. The highly efficient seals keep dirt out, grease in. Factory-packed with Norma-Hoffmann's specially compounded "stability-tested" grease ... grease that is highly resistant to oxidation and breakdown ... assures dependable operation for long periods without regreasing.

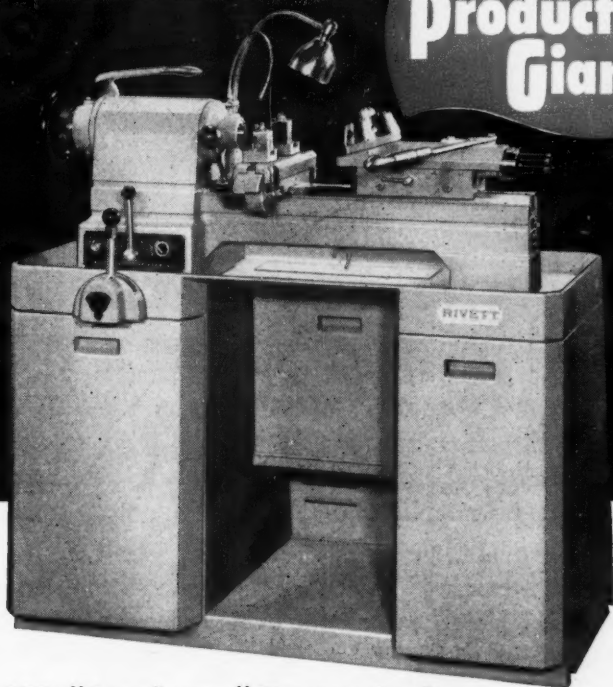
Use Norma-Hoffmann "Cartridge" Ball Bearings in your products. Our engineers are always available for consultation on your bearing applications. Write for their services.

**NORMA-HOFFMANN**  
*Precision* **BEARINGS**  
BALL • ROLLER • THRUST

NORMA-HOFFMANN BEARINGS CORPORATION • STAMFORD, CONN.  
FIELD OFFICES: Atlanta, Birmingham, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Jacksonville, Kansas City, Los Angeles, San Francisco, Seattle

*A toolroom baby that's grown into a*

**Production  
Giant!**



## Rivett 918 "Steelway" Turret Lathe

Now you can produce small duplicate parts speedily in unlimited quantities with precision known only to the toolroom!

For here's a lathe that's been developed out of the bench class into a production machine. It has all the inherent precision for which Rivett has long been famous, plus time-saving features that reduce set-up and cutting operations to a fraction of that normally required. Single part production

can be powered and cycled automatically.

Any one of 120 to 3750 RPM cutting speeds may be instantly and accurately selected; newly designed collets increase speed of operation as well as accuracy and gripping power; automatic chuck closer and well grouped controls step up operator time.

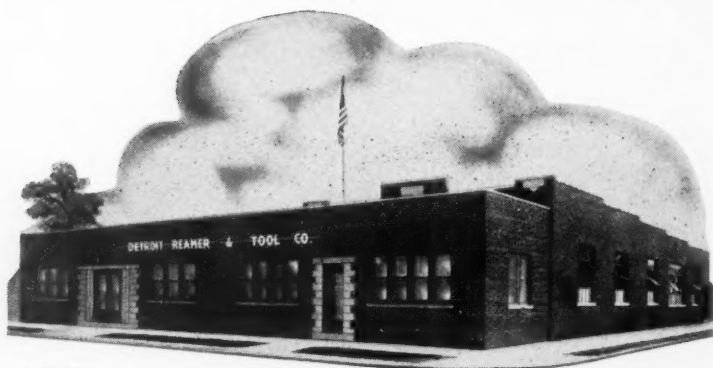
Bulletin 918ST will give you all the details. Write for your copy today.

**RIVETT**

**LATHE & GRINDER, Inc.**

Dept. MMSR-9, Brighton 35, Boston, Massachusetts

For More Precision Work RELY ON RIVETT LATHES AND GRINDERS, The Master Craftsman's Master Tools



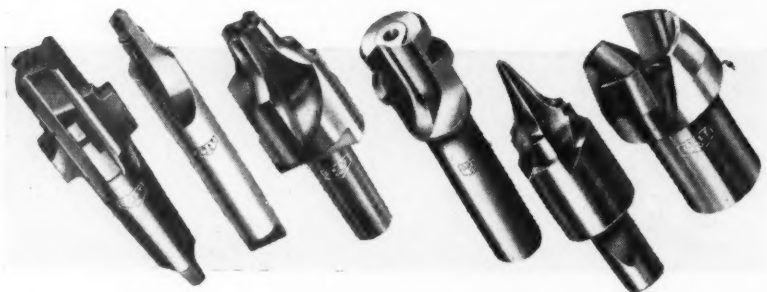
## DETROIT REAMER & TOOL CO.

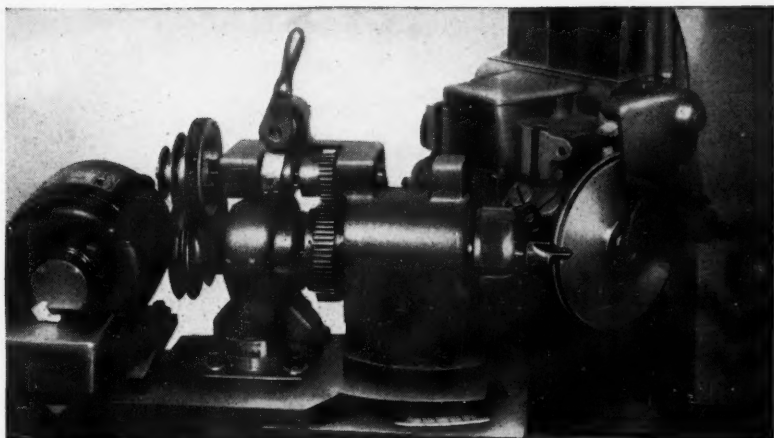
2830 E. SEVEN MILE RD. • DETROIT 34, MICH.

The Detroit Reamer & Tool Co. Plant is equipped with the finest in modern machinery and inspection facilities to provide you with the ultimate in precision tools. Our Engineering and production personnel with 35 years of empirical knowledge behind them are completely qualified to expertly handle your tool needs. For dependable cutting tools—specify Detroit Reamer & Tool Co.

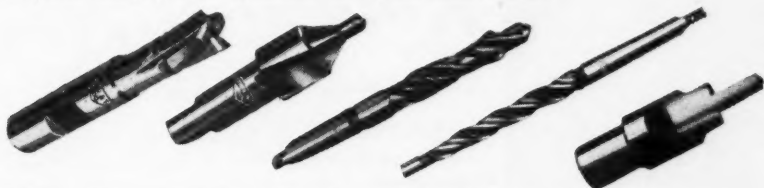
The Detroit Reamer & Tool Company has developed the

*Special Cutting Tools of* **DEPENDABLE QUALITY**





Circularity-Grinding Attachment illustrated above to permit your own tool makers to quickly and easily answer your production requirements for new cutting tools. With this attachment, new cutting tools can be quickly ground from raw stock, old tools converted to meet new requirements or standard tools reground to your specifications. The Circularity Grinder is of inestimable value when emergencies exist, demand for a new tool is urgent or production lines must be kept running. With this attachment in your shop you eliminate delayed deliveries.



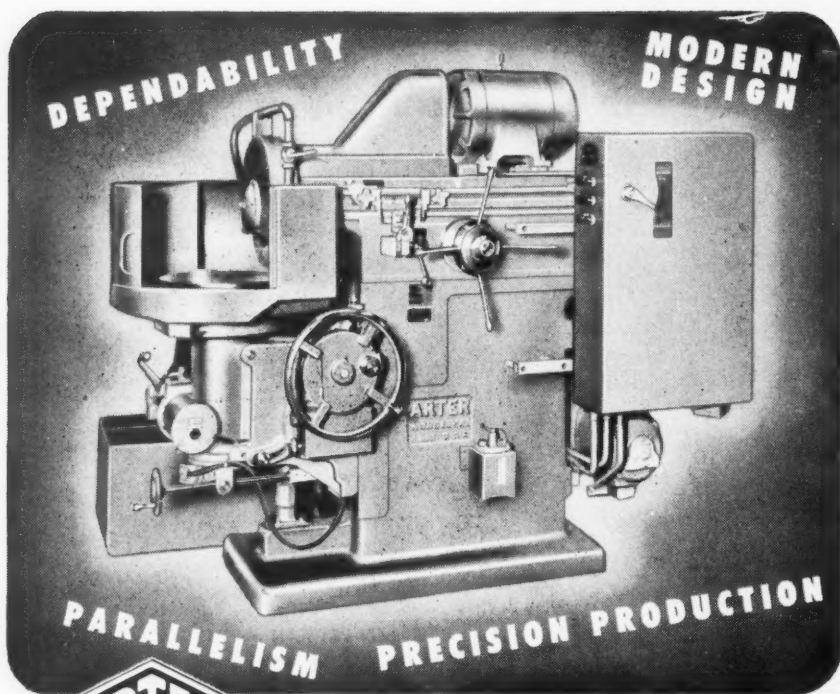
*You Can Grind Tools Like These on a* **DETROIT REAMER CIRCULARITY GRINDING ATTACHMENT**

---

**"PRECISION CUTTING TOOLS OF DEPENDABLE QUALITY"**

*manufactured by*

**DETROIT REAMER & TOOL CO., DETROIT 34, MICHIGAN**



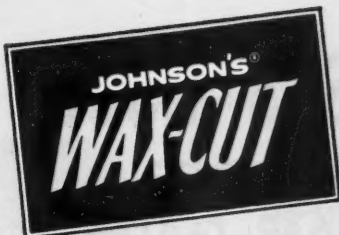
## *Rotary* **SURFACE GRINDERS**

**Model D • 12" and 16"**

Arter has been building Rotary Surface Grinders for more than thirty years. The Model D machines are an intermediate series, 12" and 16" in diametrical capacity. They are modern in design, dependable and built to give years of satisfactory service to all users of this type of precision grinder.

*Write today for complete details and specifications.*

***Arter* GRINDING MACHINE CO.**  
**WORCESTER 5, MASSACHUSETTS**

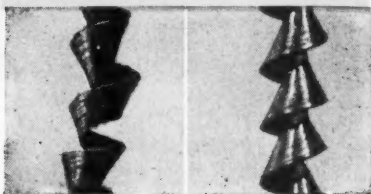


# The New Wax-Type Cutting Oil

**Proved: Longer tool life,  
better performance, operator preference**

*Johnson's No. 120 Wax-Cut* is the new *wax* cutting oil for automatic screw machines, gear cutting machines and other tools now using oil-type cutting fluids.

Months of testing at the University of Michigan and in production shops *proved Wax-Cut* has these advantages over sulphurized, chlorinated oils: Greatly increased tool life... better cutting results... none of the objectionable qualities of E. P. oils.



Metal curls from automatic screw machines: Clear metallic color of chip on right shows extreme reduction of heat on machine using *Wax-Cut*, compared to burned chip taken from machine using E. P. oil.

**A product of  
JOHNSON'S WAX  
Research**



## ► Far longer tool life

*The greater lubricity of wax* makes possible a much cooler operation... therefore greatly extended tool life.

## ► Non-corrosive

No chemically active additives—so it will not stain non-ferrous metals nor attack machine bearings, gear mechanisms, or other parts.

## ► Far cleaner . . . odorless . . . will not turn rancid

## ► Lower daily consumption

Much less smoking, burning, atomization, consumption. Low viscosity means less "carry-off."

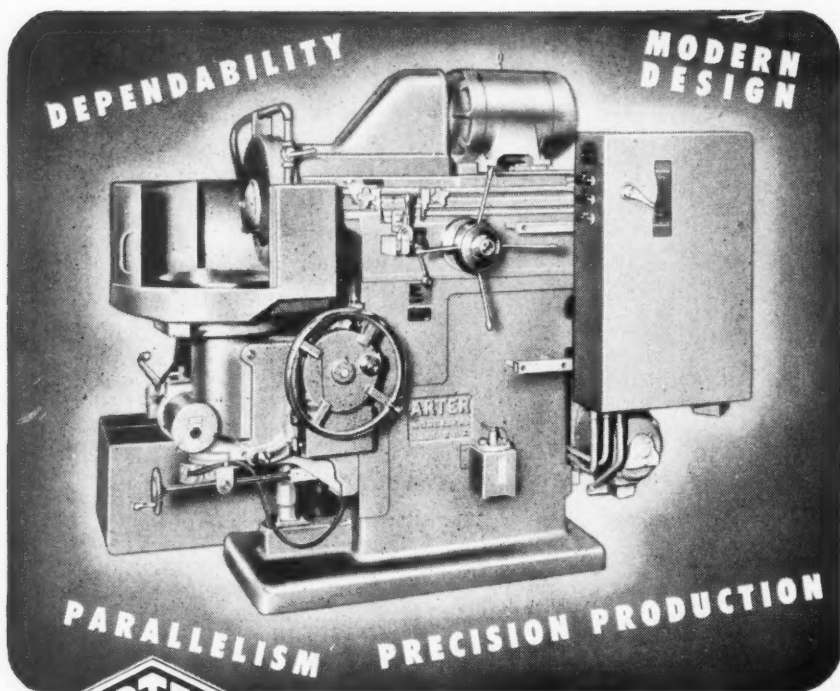
## ► No mixing, no mess

## ► Lower operating costs!

Longer tool life... less down time... uninterrupted production—these benefits of *Wax-Cut* can reduce *your* operating costs, too! A test in your shop will prove it.

*Send for complete  
information today!*

Industrial Products Department MM9  
S. C. Johnson & Son, Inc.  
Racine, Wisconsin



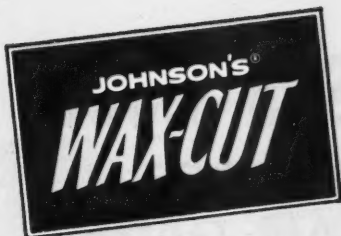
## *Rotary* **SURFACE GRINDERS**

**Model D • 12" and 16"**

Arter has been building Rotary Surface Grinders for more than thirty years. The Model D machines are an intermediate series, 12" and 16" in diametrical capacity. They are modern in design, dependable and built to give years of satisfactory service to all users of this type of precision grinder.

*Write today for complete details and specifications.*

***Arter* GRINDING MACHINE CO.**  
**WORCESTER 5, MASSACHUSETTS**



# The New Wax-Type Cutting Oil

**Proved: Longer tool life,  
better performance, operator preference**

*Johnson's No. 120 Wax-Cut* is the new *wax* cutting oil for automatic screw machines, gear cutting machines and other tools now using oil-type cutting fluids.

Months of testing at the University of Michigan and in production shops *proved Wax-Cut* has these advantages over sulphurized, chlorinated oils: Greatly increased tool life... better cutting results... none of the objectionable qualities of E. P. oils.



Metal curls from automatic screw machines: Clear metallic color of chip on right shows extreme reduction of heat on machine using *Wax-Cut*, compared to burned chip taken from machine using E. P. oil.

**A product of  
JOHNSON'S WAX  
Research**



## ► Far longer tool life

*The greater lubricity of wax* makes possible a much cooler operation... therefore greatly extended tool life.

## ► Non-corrosive

No chemically active additives—so it will not stain non-ferrous metals nor attack machine bearings, gear mechanisms, or other parts.

## ► Far cleaner . . . odorless . . . will not turn rancid

## ► Lower daily consumption

Much less smoking, burning, atomization, consumption. Low viscosity means less "carry-off."

## ► No mixing, no mess

## ► Lower operating costs!

Longer tool life...less down time... uninterrupted production—these benefits of *Wax-Cut* can reduce *your* operating costs, too! A test in your shop will prove it.

*Send for complete  
information today!*

Industrial Products Department MM9  
S. C. Johnson & Son, Inc.  
Racine, Wisconsin

# Gaging Costs Less

with a TAFT-PEIRCE  
CompAIRator AIR GAGE



## **It's FASTER**

A Taft-Peirce CompAIRator reads instantaneously to .0001" or less . . . without mechanical contact . . . without flutter or creep. There's virtually no time lag even when gaging at considerable distance from unit.

## **It's More VERSATILE**

Ideal for any type of production measurement from simple diameters to complex multi-dimensional checks. Supersensitive, it can be used in checking alignment, flatness, concentricities, squareness of bore to face, center distances, and tapers.

## **It's More ECONOMICAL**

Eliminates wear of gaging members . . . saves constant checking and replacement. Little or no maintenance is required.

## **It's SIMPLE**

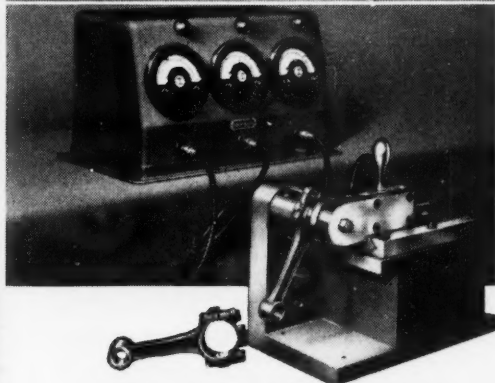
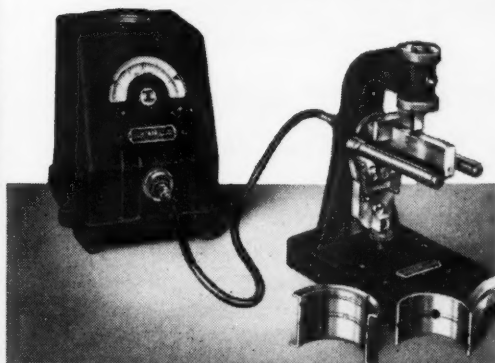
Anyone who can read a dial can operate a T-P CompAIRator. What's more, it's portable, easy to adjust, and can be equipped with any one of several standard dials and amplifications.

## **It's DEPENDABLE**

Vibration, jarring, tilting will not disturb accuracy . . . nor will sludge or coolant flow —air pressure automatically clears gaging area.

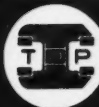
Write today for Bulletin

**T-P Single Dial CompAIRator**  
checking wall thickness of bearing liners. Special  
fixture adjusts to check range of bearing sizes.



**T-P Triple Dial CompAIRator**  
measures face squareness (to hole), hole size, and  
face width of connecting rod, in one pass.

*T-P means  
Top Precision*



**THE TAFT-PEIRCE MANUFACTURING COMPANY**  
WOONSOCKET, RHODE ISLAND

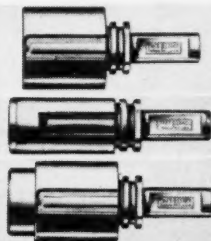
## Standard Accessories



**T-P HORIZONTAL STANDS.** Excellent for bench inspection or use with large plugs, they facilitate gaging at a distance from indicator.



**T-P VERTICAL STANDS** speed measurements in vertical plane. Special fixtures are designed and built on request.



### T-P GAGE PLUGS

available for thru holes, blind holes, and counterbores, from .055" D upward. Also with Emmerton, bullet-nose, or Taft-Peirce pilots.



**T-P AIR GAGE RINGS** for external diameters .125" up. Available with 3 nozzles instead of 2 for centerless ground work.



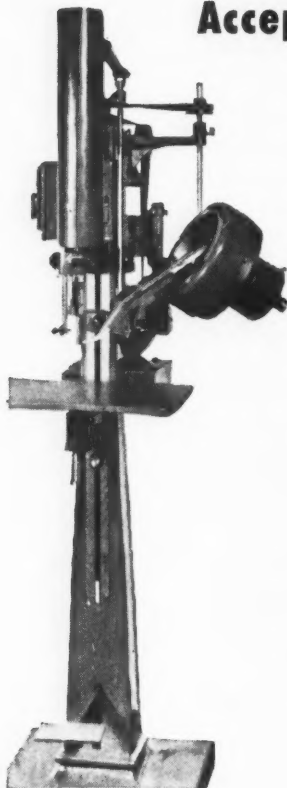
**T-P ADJUSTABLE AIR SNAP GAGES** available in range from .125" to 6 3/4". Anvils have 3/8" range of adjustment.

**T-P EXTENSION TUBES** furnished in 2, 4, 6, and 10 foot lengths for hand or fixture gaging.



# Yes, We Can Do It!

## **We Can Quote on Your Application, Accept Your Order and DELIVER**



We are in an enviable position whereby we can deliver the answer to your assembly problem in the form of a particular piece of equipment designed especially for your needs . . . We can do it NOW—not maybe—some time in the future. Though generally speaking, deliveries throughout industry are uncertain, and this situation probably may continue for some time, our position is different . . . We have marshalled our resources and facilities in a way whereby we can positively assure the execution and delivery of your orders without delay.

### **DETROIT POWER SCREWDRIVERS, HOPPER FEEDING UNITS**

#### **NUT DRIVERS, SPECIAL ASSEMBLING MACHINES**

Thousands of manufacturers have profited through greatly stepped-up production as a result of our service. You, too, can benefit by the use of D. P. S. power-driven machines. Get further details. Also send sample assembly for production estimate.

## **DETROIT POWER SCREWDRIVER CO.**

**2807 W. FORT ST.**

**DETROIT 16, MICH.**

SEND FOR  
FREE CIRCULARS.

## MATTISON HIGH-POWERED PRECISION SURFACE GRINDERS

• Rugged, High Powered and Versatile, Mattison Precision Surface Grinders with double-column construction are built to handle your grinding jobs on a real production basis, providing repeated precision results and a fine finish.

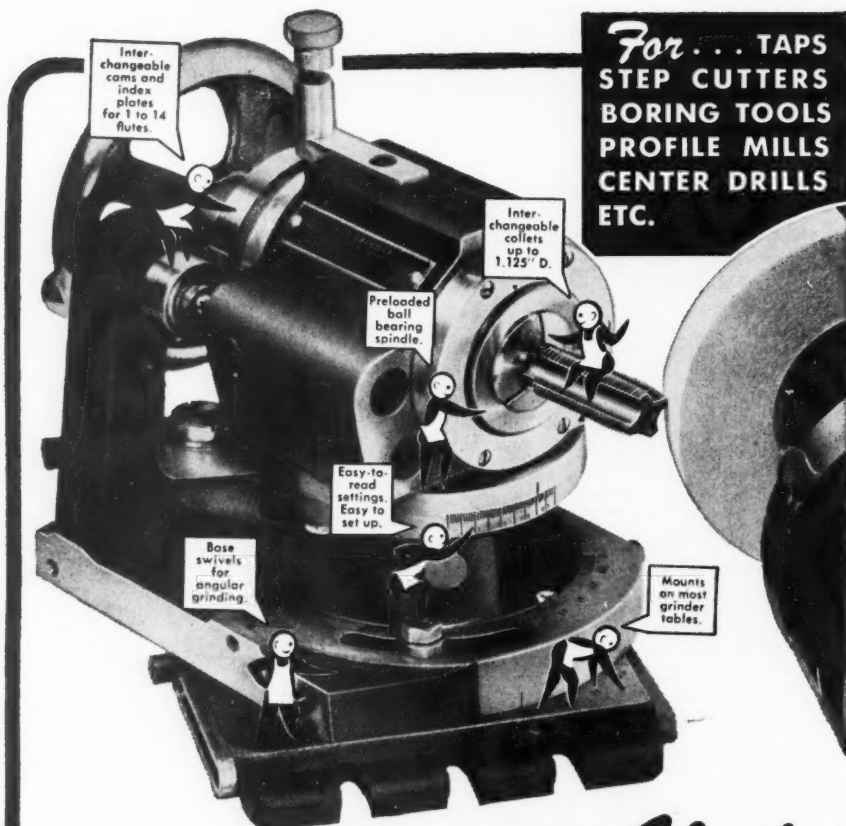
They are built with table sizes from 12" to 36" wide by 36" to 192" long.

### WIDE ABRASIVE-BELT GRINDING and POLISHING MACHINE

• From the time factory coated abrasives were introduced for metal polishing and grinding, Mattisons have developed and built machines properly applying belts to do the job to be done. The Wide-Belt Sheet Grinder and Polisher shown above is for finishing stainless steel and alloy sheets in sizes up to six feet wide and sixteen feet long.

**MATTISON**  
ROCKFORD • ILLINOIS

**MACHINE WORKS**



*For . . .* TAPS  
STEP CUTTERS  
BORING TOOLS  
PROFILE MILLS  
CENTER DRILLS  
ETC.

# *What a relief!*

**More Cuts Per Grind  
Better — Freer Cutting**

Reduce perishable tool costs with this preferred grind on your straight and spiral flute production cutters — Easy and fast as ordinary angular relief grinding.

D·S GRINDER DIVISION  
**ROYAL OAK TOOL & MACHINE CO.**  
621 E. Fourth St., Royal Oak, Mich.

**D·S**  
**RADIAL  
RELIEF  
GRINDER**



## NEW *Pneumatic Drill*

***50% more powerful than previous models***

Weighing only  $2\frac{3}{4}$  pounds, with  $\frac{1}{4}$ " heavy-duty chuck, the CP-3017 PNEUMATIC DRILL has ample power to drill high-strength alloys, rapidly and cleanly, without stalling on break-through.

Graduated poppet type valve gives controlled starting. Built-in regulator permits reduction of speed and power if desired. Oil reservoir in handle for motor lubrication.

The CP-3017 is available in five models with speeds ranging from 500 rpm to 15,000 rpm.

WRITE FOR BULLETIN SP-3059



**CHICAGO PNEUMATIC  
TOOL COMPANY**

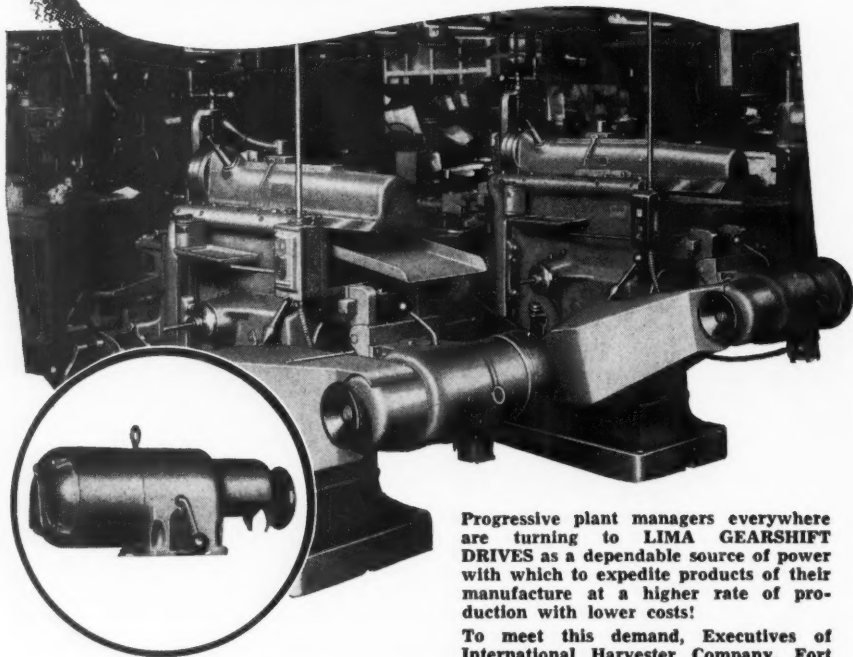
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES  
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

# LIMA GEARSHIFT DRIVES

*increase production*

## at International Harvester Co. Plants



### LIMA GEARSHIFT DRIVES

Available for prompt delivery in sizes from  $\frac{1}{4}$  to 25 HP. Furnished in either integrally mounted motor, or motorless types.

Progressive plant managers everywhere are turning to LIMA GEARSHIFT DRIVES as a dependable source of power with which to expedite products of their manufacture at a higher rate of production with lower costs!

To meet this demand, Executives of International Harvester Company, Fort Wayne, Indiana, have individually motorized a large number of their machines with LIMA GEARSHIFT DRIVES, and are piling up enviable records of increased production at lower costs. The advantages offered by LIMA DRIVES can solve your problems too.

*Complete engineering facilities available*

# LIMA

THE LIMA ELECTRIC MOTOR COMPANY

WRITE FOR LITERATURE

*Representation in principal cities*

## GEARSHIFT DRIVES & MOTORS



129 FINDLAY ROAD • LIMA, OHIO



# "Now you can clean hydraulic systems without interrupting production!"

**Shell has developed** a unique method of cleaning and dehydrating all classes of hydraulic systems. The Shell Cleaning

Method does the job quickly and thoroughly . . . without wasting valuable production time. These are the highlights:

## ***It's thorough***

This tested method employs a special oil that cleans while your machines operate during a regular production shift.

## ***It dehydrates . . . removes sludge***

The special cleaning oil will materially dehydrate wet sludges in a system and remove them . . . at the same time it has high solvency for products of oxidation. It coats critical surfaces with an effective rust preventive so that no part of the mechanism is unprotected while the cleaning oil is drained from the unit.

## ***It costs little***

The cost of using the Shell Cleaning Method is surprisingly low, since no expensive material nor equipment is required.

***"and when it's clean . . . fill it with Shell's Improved Tellus Oil"***



**This is the one inhibited oil that:**

- 1. Prevents Rusting . . . with a new combination of rust inhibitors . . . licks the rust problem for good.**
- 2. Reduces Foaming . . . even with minor air leaks in the system.**
- 3. Excels in Oxidation Stability . . . prevents sludging and emulsion formation.**
- 4. Prevents wear . . . maintains tenacious film of great strength at all times.**

SHELL OIL COMPANY,  
50 W. 50th St., New York 20, N. Y. or  
100 Bush Street, San Francisco 6, Cal.

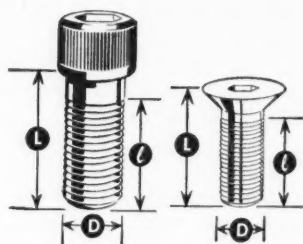
## **SHELL HYDRAULIC OILS**





**UNBRAKO®**

**SOCKET SCREW DIVISION**



## WHY IS IT THAT 75% OF ALL SPECIAL SOCKET SCREWS ORDERED FROM SPS HAVE ODD THREAD LENGTHS?

75% of all screws classified by SPS as *specials* have odd thread lengths, probably because of widespread unfamiliarity with thread formulas.

In many cases, *standard* UNBRAKO Socket Screws can be substituted. They will save you time and money. They are available from the stocks of your local distributor. Ask him or write us for your copy of UNBRAKO Standards. STANDARD PRESSED STEEL CO., Jenkintown 22, Pennsylvania.

### What Are the Standard Thread Lengths?

The authority for the thread formulas used by SPS and other threaded fastener manufacturers is Handbook H28, Screw Thread Standards for Federal Services, National Bureau of Standards. It reads:

The length of the screw thread is measured from the extreme point to the last usable thread and shall be as follows:

For American  
National—Coarse  
Thread Series

$L = 2D + \frac{1}{2}''$  (where this length of thread would be greater than half the screw length).

$L = \frac{1}{2}L$  (where this length of thread would be greater than  $2D + \frac{1}{2}''$ ).

For American  
National—Fine  
Thread Series

$L = 1\frac{1}{2}D + \frac{1}{2}''$  (where this length of thread would be greater than three-eighths the screw length).

$L = \frac{3}{8}L$  (where this length of thread would be greater than  $1\frac{1}{2}D + \frac{1}{2}''$ ).

**SPS**  
JENKINTOWN PENNSYLVANIA

Screws too short to allow application of these formulas shall be threaded as close to the head as practicable.

CAP SCREWS • SET SCREWS • SHOULDER SCREWS  
DOWEL PINS • PRESSURE PLUGS




# IDENTIFY *By Marking!*


ROUND — FLAT — IRREGULAR

## SHAPES

*They're All the Same to Us!*



Modern marking machines are built to roll lettering on almost any surface—flat, round, irregular or what have you!



Flexible tooling can be provided to handle all in ONE MACHINE.

Single purpose production machines with automatic feeds are cost reducers.

Send us your prints or samples showing markings required, and hourly production required and we will submit recommendation with quote.

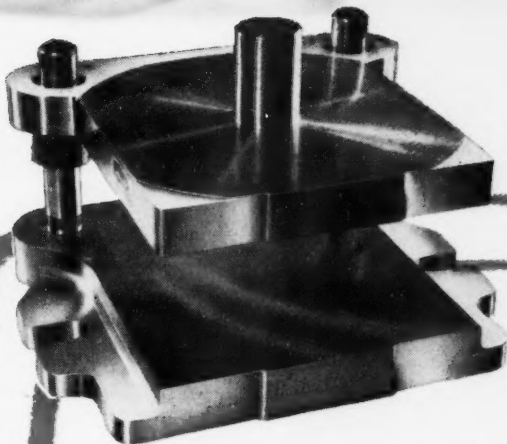
If It's Worth Making—It's Worth Marking.  
If It's Worth Marking—Mark It Well.



**GEO. T. SCHMIDT, INC.**

1806 West Belle Plaine Avenue  
Chicago 13, Illinois





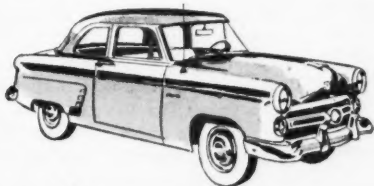
## **DANLY DIE SETS**

*helped FORD retool for '52*

Somewhere behind the scenes in almost every outstanding mass production operation, you'll find Danly Die Sets at work . . . saving time in the die shop and assuring longer production runs in the press room. Danly Die Sets are the first choice of diemakers everywhere.

### **DANLY MACHINE SPECIALTIES, INC.**

2100 South Laramie Avenue • Chicago 50, Illinois



✱ Get your **DANLY DIE SETS** from your conveniently located  
**DANLY BRANCH ASSEMBLY PLANT**

- ✱
- ✱ **CHICAGO** 50.....2100 South Laramie Avenue
  - ✱ **CLEVELAND** 14.....1550 East 33rd Street
  - ✱ **DAYTON** 7.....3196 Delphos Avenue
  - ✱ **DETROIT** 16.....1549 Temple Avenue
  - ✱ **GRAND RAPIDS**.....113 Michigan Street N.W.
  - ✱ **INDIANAPOLIS** 4.....5 West 10th Street
  - ✱ **LONG ISLAND CITY** 1.....47-28 37th Street
  - ✱ **LOS ANGELES** 54 Ducommun Metals & Supply Co.  
4890 South Alameda
  - ✱ **MILWAUKEE** 2.....111 East Wisconsin Avenue
  - ✱ **PHILADELPHIA** 40.....511 W. Courtland Street
  - ✱ **ROCHESTER** 4.....16 Commercial Street

✱Indicates complete stock



DIE SETS AND DIEMAKERS' SUPPLIES

## over the editor's desk

### Winning the Race

**A** recent issue of MACHINE TOOL PROGRESS, published by the National Machine Tool Builders' Association, reports that in spite of very large cancellations, the American machine tool industry continues to increase its production and its physical capacity for production in the nation's service. The industry points to a steady increase since August, 1951, when it finally got the green light and found out what was expected of it and what its prices were to be.

The machine tool industry is now producing at a rate of over \$1 billion a year and its total 1952 production bids fair to double the total 1951 output. Production in May, 1952, rose to five times the output in July, 1950, the month after action started in Korea.

The backlog of unfilled orders, often of such concern to military authorities, reached its peak in September, 1951, when it was equal to 23.5 months production at the rate of shipments then obtaining. This figure dropped to 13.7 months as of June 1, 1952.

### The Diamond Situation

**M**R. L. H. Metzger, president of Super-Cut Incorporated of Chicago, who has just returned from attending a conference in Johannesburg, Union of South Africa, has written us that the present

scarcity and high prices of diamond powder for grinding wheels has been caused by greatly increased demand in the United States and higher costs of production and is not the result of alleged "planned shortages" on the part of Industrial Distributors Ltd., which firm distributes 95 per cent of the world's industrial diamonds.

Industrial Distributors has already spent \$7,500,000 to expand and improve production facilities at the Premier mine and will spend additional millions in other mines. The producers are even working the diamond dumps in order to recover smaller bort previously passed up.

New equipment and methods of mining have increased the recovery at the Premier mine to one carat from each 3½ tons of material handled whereas before only one carat was recovered from each 5 tons processed under older methods.

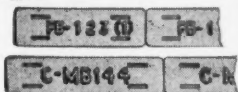
Mr. Metzger points out that while this does not mean there will be a great immediate increase of crushing bort shipped here, it does mean that the producers are aware of our shortages and are doing what they can to increase production.

The Conference in Johannesburg was conducted by the Chemical, Metallurgical, and Mining Society of South Africa at the suggestion of Industrial Distributors and was attended by industrialists, metallurgists and mining experts from all over the world.

**USE**

**PANNIER  
"MASTER MARKER"**

**Nicked and  
Notched**



NAVY CABLE TAGS



**other styles too**



## METAL SAFETY TAGS

*for Positive  
Identification*

**and safe, efficient handling**

Materials and tools are efficiently separated, stock bins easily marked and shipping legibly identified when you use Pannier SAFETY TAGS. Durable, easily attached, and proof against defacing, these tags are supplied blank or with company name; are available in individual units or coiled lengths, and in tin, copper, brass, aluminum, steel, stainless steel and other metals .014" thick or lighter. Coiled tags are nicked for easy separation, and notched for proper feeding into Pannier or other embossing machines; are available with slots or holes as desired.

### FREE DATA!

Ask for Bulletin D-10, giving full information about Pannier SAFETY TAGS and Embossing Equipment.

**OFFICES:** Chicago • Los Angeles • Youngstown • Philadelphia • Jacksonville

## THE PANNIER CORPORATION



**202 Pannier Building**

**Pittsburgh 12, Pa.**

**Export Department: Bessemer Bldg., Pittsburgh, Pa.**

# ARMSTRONG

## TOOL HOLDERS . . .

### for the Toughest steels!



WRITE FOR CATALOG

The "Armstrong System" provides special ARMSTRONG TOOL HOLDERS for ARMALLOY (cast alloy) and for ARMIDE (carbide-tipped) cutters. With these modern cutting tools, the toughest and hardest steels are easily machined. Far heavier feeds and the extremely high cutting speeds become practical (300 f.p.m. with ARMALLOY cutters; 600 f.p.m. with ARMIDE cutters). Delays for tool re-grinding are reduced to an absolute minimum—edges hold up to 100 times as long.

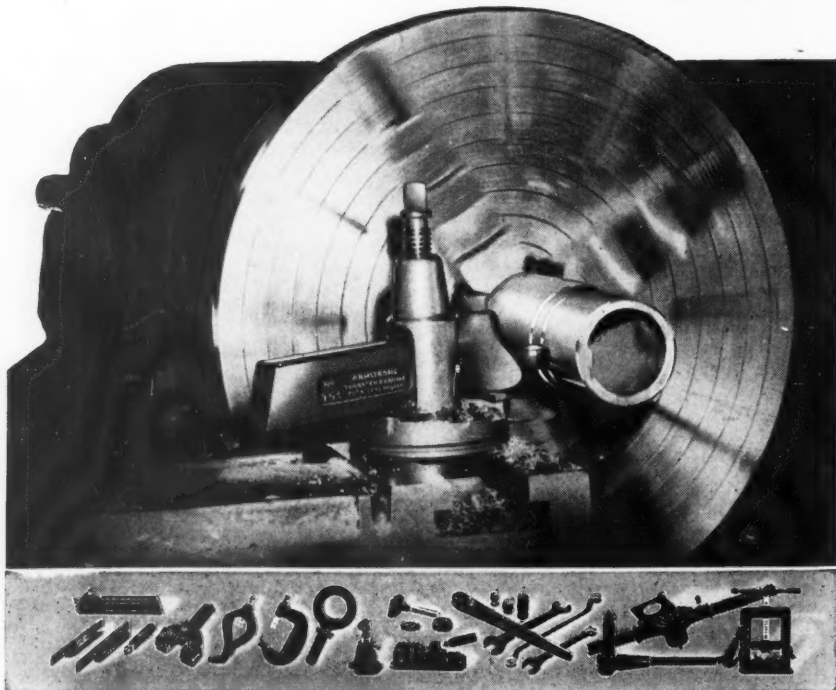
These new tool holders and cutters are stocked by your Local ARMSTRONG industrial distributors.

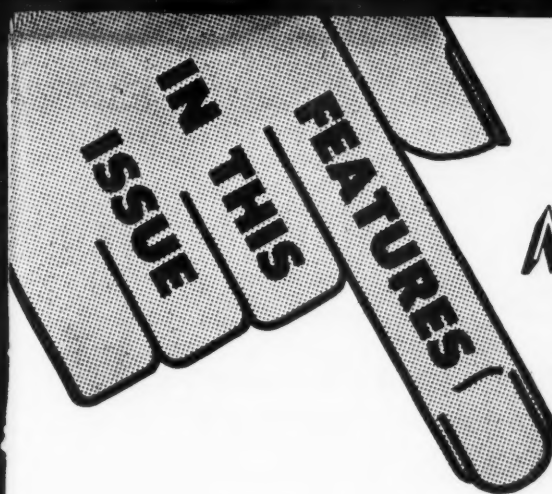
**ARMSTRONG BROS. TOOL CO.**

*"The Tool Holder People"*

5228 WEST ARMSTRONG AVE.

CHICAGO 30, U.S.A.





IN THIS  
ISSUE

FEATURES

# MODERN Machine Shop

Vol. 25, No. 4  
SEPTEMBER, 1952

## **Pre-Planned Production Pays Dividends**

**By Gilbert C. Close**

The author tells how the use of a "package" method in designating and assigning machining operations has enabled Douglas Aircraft to reduce costly bottlenecks in production to a minimum. Page 124.

## **Improved Jigs and Fixtures for Less Money**

**By Frank Charlly**

A description of the use of a laminated fabric material in the construction of drilling jigs, routing forms, sawing forms, and so on. Page 130.

## **Timely Tips on Machining Stainless Steels**

**By George J. Stevens**

The author's search for better methods of machining stainless steels has led him to suggest the practical ideas presented in this article. Page 136.

## **Cutting Costs by Practical Dimensioning**

**By E. C. Helmke**

This article was prepared from information obtained from the new 40-page booklet entitled "Practical Dimensioning" which is being made available through the Gisholt Machine Company. Page 142.

## **More Production Through Better Understanding of Machinability**

**By K. R. Blake**

An article based on the author's paper "Dynamomics—A New Concept in Metal Removal" which he delivered to the Twentieth ASTE Annual Convention. Page 158.

## **Interpreting Business Legislation**

**By Robley D. Stevens**

In this article the author discusses the Federal Wage-Hour Law as it affects machine shop foremen. Page 192.

## **Chucking Fixture for Contoured Workpieces**

**By W. M. Halliday**

In which the author describes his own experience in designing and fabricating a special fixture for holding contoured workpieces. Page 216.

## **The Low Down on Air Gaging**

**By C. W. Kennedy**

An article in which the author explains the operating principle, use and care of air gaging equipment. Page 230.

# Pre-Planned Production Pays Dividends

Costly bottlenecks in production eliminated when  
machining operations are "packaged"  
for the operator.

BY GILBERT C. CLOSE

**W**HILE "planned" production has been practiced for years in many facets of industry, and especially in conjunction with mass assembly and production lines, the machine shop has often been ignored as a place where pre-planning just wouldn't work. The highly personalized nature of most precision machine jobs contributed to this idea. It was unthinkable a few years back to tell any skilled machinist what tools to use on a job and how to prepare or grind them to obtain best results. To do so would be to insult a tradition.

This picture has changed, but at no cost to the reputation of skilled machine work. The change was wrought by several factors. First, the influx of trainees during the past decade of critical defense production brought a lot of men into the picture who needed some guidance in their work. While they could learn to operate a specific machine efficiently in a period of a few months, they lacked the years of apprenticeship required to guide them over the humps and around the detours that crop up in every precision

machine job. They needed to be told what tools to use, or better yet, have the tools prepared and laid out for them and ready at hand when a new job was started.

Other factors which have made planned machine shop production a necessity include design tolerances far narrower than ever before encountered, the use of new materials on which there was a total lack of machining experience (such as the plastics, high temperature alloys, titanium, and so on), shop overloading caused by the pressure of defense production, and constant design changes as we raced to improve our defense products faster than the enemy.

The aircraft industry was a leader in pre-planning machine shop work. Here, perhaps more so than in the older and established industries, the above contributing factors necessitating this pre-planning were sharp-etched and pronounced. Production pressures were heavy, personnel was either new or inexperienced in the close tolerances required in aircraft work, new materials never before machined were being

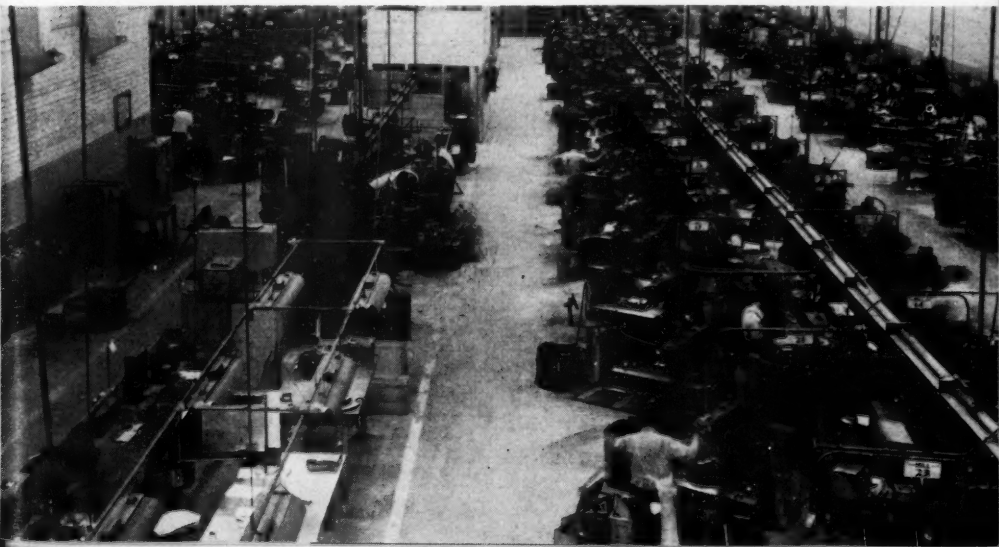
used, design changes flooded the shop in a mad race to improve the speed, performance and safety of our airplanes.

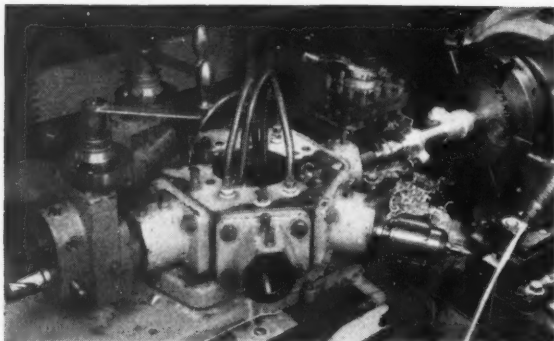
Today, the El Segundo Division of Douglas Aircraft Company is one plant where pre-planning of machine shop work is carried out to a zenith of efficiency. A machinist in this plant need not worry about which tools to use or how to prepare them for the job. He never has to shut down his machine while he regrinds the taper on a drill or cutter. He is seldom "high-pressured" by shop overload, nor does he have to stand idle waiting for work. Furthermore, he is aware that the job on which he is working has been made as simple as possible consistent with requirements of the part. He is not spending needless hours of sweat and patience, tolerances, hole patterns, dimensions and contours that serve only to satisfy the vanity of some design engineer. Every movement he makes is precalculated to contribute its entire effect to another finished airplane.

This pre-planning of shop work starts long before the part reaches the machine shop. The first constructive action taken is close cooperation between the Planning department and Engineering during design of the part. The purpose of this association is to influence the engineers to reduce close tolerance dimensions on hole patterns, concentricities, finishes, and so on, when and where such exacting work will serve no constructive purpose. Everything possible is done to foster simplicity in the design of machined parts to aid the machinist, speed production, and simplify required tooling.

When the engineering drawings are finally released to the Planning department, it becomes the planner's function to analyze the drawing thoroughly as regards to necessary tooling, sequence of operations, processes, methods, condition of materials, and the schedule requirements for the fabrication of the part. In this initial analysis, tooling receives first and major consideration.

General view of one section of the Douglas El Segundo machine shop. The time saved on each pre-planned and "packaged" machine job multiplied by the number of employees, amounts to a substantial saving in production time and machine costs, and increases overall shop efficiency.

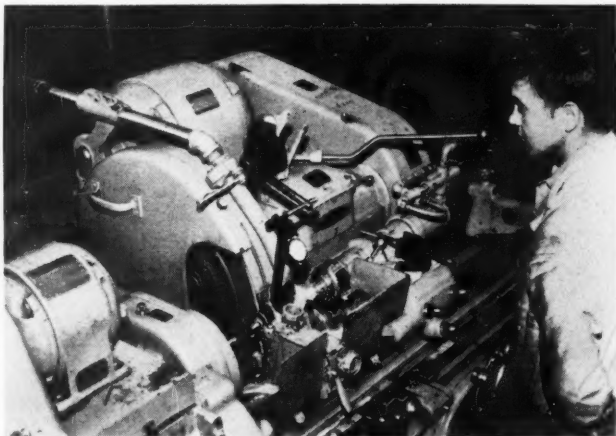




This center drill and reaming job could be accomplished on an engine lathe. But a turret lathe is faster. Pre-planning made certain that the right type of equipment would be used.

In the determination of tooling requirements, several factors are given consideration. First, the type of equipment to be used—mills, drills, grinders, and so on—is outlined. This is elementary. More complex is the determination of which particular tools within a given type will do the work fastest and most economical. A typical problem is this—should the planner disregard the quantity of parts, or the schedule, and plan a job for an engine lathe when it should have been planned for a turret lathe, the cost per part as a result of greater tooling requirements and running time would be high by comparison.

Young machinists like this youthful Norton grinder operator now outnumber the old timers. These young fellows soon learn to operate a machine efficiently, but they lack the years of background experience necessary to cope with specialized and critical problems. Pre-planning the job solves these problems for them.

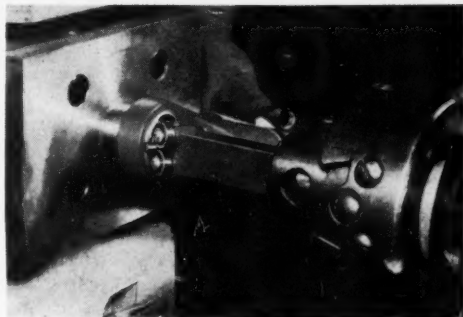


Castings, forgings, and hydraulic cylinders are typical aircraft parts that present difficult pre-planning tooling problems. Castings, for instance, may require several machined faces in different planes along with a series of closely coordinated tools to complete the sequence of operations. The same holds true for forgings, and for the many and various types of hydraulic cylinders used on the average airplane. The planner needs to exercise keen judgment and foresight to lay out such a job along with the tools required and do it in a manner to minimize work and tool requirements.

When determination of tooling, processes, methods, conditions of ma-

terial and schedules is finally made, the planner incorporates this information in a form called a "Manufacturing Outline." At this point in planning, the Manufacturing Outline along with the engineering drawing describes in its entirety the job involved and the step-by-step operations necessary. The Tooling department then uses this information to plan the design of the type of tools required. But here again the Planning depart-

When special tools are required, they are made ready and delivered along with the work. This special roll-type swaging tool being used to swage a bearing in its housing is a typical example.



ment functions in close coordination to make certain that the information on the Manufacturing Outline is correctly interpreted, and to eliminate the possibility of errors in tool development.

Concurrent with major tool design, the Planning department prepares another form called "Machine Set-Up Outline." This form lists in detail the standard and perishable tools and machine accessories that will be required for the job. The Machine Set-Up Outline is a breakdown of each operation as it appears on the Manufacturing Outline. This outline describes the set-up, and specifies the cutting tools, machine accessories, and speeds and feeds to use. It includes also any other information pertinent to that particular job that will aid the operator in completing the operation. The mill cutters, tool bits, reamers, drills and so on, to use are all listed.

This set-up outline detailing perish-

able tool requirements is delivered to the tool crib at the same time the shop order is released to pick up material and Contract Tooling (special tooling made for and chargeable only to one job contract). When the machinist calls at the tool crib for more work, he receives the raw material or part, his tooling, and a kit of the proper perish-

able tools all at one time. It is a "packaged" delivery. He won't have to call back at the crib or leave his machine for other reasons until the job is done.

Under this set-up, the tool crib ceases to be a mere tool and material storage area located for the convenience of the department. It functions as a vital link in the production program. Tools are controlled in the crib, and the use of worn, dull, damaged, or dimensionally incorrect tools is held to a minimum. Each tool is Kardexed by code number and its usage for various parts noted. This makes possible an accurate determination of tool requirements by type, and a close estimate of the number of similar tools required to complete a contract on schedule.

Now, instead of a tool inventory based on assumed usage, actual tool requirements can be established. Com-



Sometimes special tool preparation is required for a specific job, like this cutter being used to machine a sintered bearing. At the Douglas El Segundo plant, the prepared cutter and rough bearing is delivered from the tool crib in the form of a "packaged" job.

pletion of this tabulated Kardex system resulted in the sharp reduction in the quantities of drills, reamers, boring bars, mill cutters, tool bits, and so on, to be kept on hand. From the direct cost standpoint, considerable savings are realized by having all tools ground and prepared in the tool crib by grinding specialists. They can do the work much faster and often better than a machinist who has to shut down his machine, seek out a grinding wheel, then grind the tool to his satisfaction.

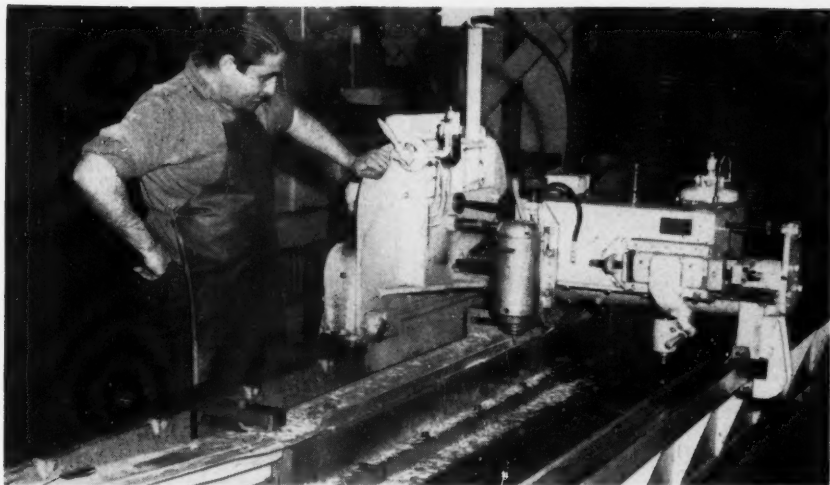
In order to maintain an even flow of work to different machine shops, and to prevent overloading of one section while another lacks work, the Douglas Planning department, in conjunction with the Statistical department, fulfills a function termed "Shop Loading." This program is set up on the basis of forecasting the number of hours of work to be accomplished during a given period. The forecast is made as far in advance as possible to establish man-hour requirements and to indicate which sections or machines may be overloaded or stand idle.

Another survey is made just prior

to the scheduled release of shop orders. This survey establishes the hours capac-

ity in the different shop divisions. Then, with this "hours required" versus "hours capacity" information, it is relatively simple to control the work flow so that all sections of the shop are evenly loaded. This pre-established work flow has a contributing advantage in that when special or emergency jobs crop up at unexpected intervals, they can be placed where shop loading is lightest at the moment, thus taking up any slack that may occur. Also, with this pre-planned work schedule, it is easy to re-route some work when a breakdown or absenteeism causes a temporary overload in any one section.

This pre-planning of machined parts production has been practiced at Douglas for several years now, and everyone touched upon by the plan seems well satisfied. Management is satisfied because production is faster and costs have been cut down. The average machinist is well satisfied with the set-up as it simplifies each job materially. Repeated trips to the tool crib are unnecessary; his tools are prepared by experts for the job at hand; the instructions on the Machine Set-Up Out-



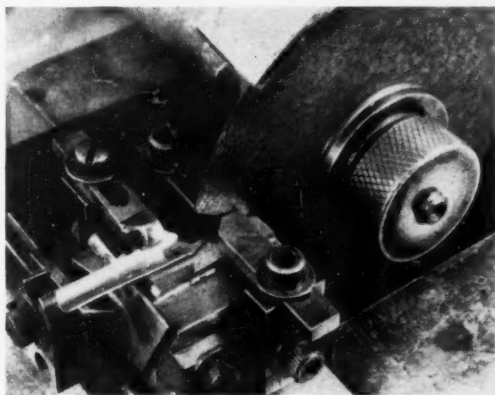
Some jobs require a number of perishable tools to be used in a sequence of operations, like the facing operations on this airplane wing spar cap. At Douglas, no doubt as to the tools to use nor the sequence of operations is left in the operator's mind. His tools are delivered along with the work; instructions as to the set-up and sequence of operations are included.

line simplify many problems that otherwise would call for consultations with supervisory personnel. With all perishable tools controlled through the tool crib, duplication of tools for the same job by machinists on different shifts is eliminated.

In brief summary, it may be said that this pre-planning machined parts production has all the aspects of a progressive efficiency measure instigated to eliminate the many bottlenecks that so often result in confusion, loss of time and temper, and wasted effort.

### Grinding Wheel 0.006-Inch Thick Slits Pen Points

**O**NLY twice the width of a human hair, the 0.006-inch thick x 3½-inch diameter rubber-bonded Norton grinding wheel shown in the accompanying illustration is used on a slitting machine at the Esterbrook Pen Co., Camden, N. J., to slit the nibs of pen points. The abrasive used is Regular "Alundum" (grit size, 240).



# Improved Jigs and Fixtures for Less Money

Resin impregnated fabric material used in new fixture-fabrication process.

BY FRANK CHARITY

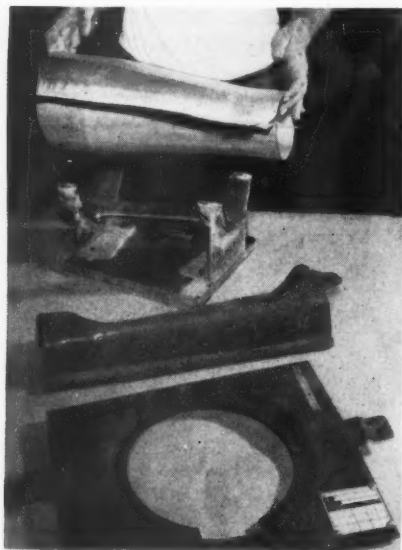
**I**N order to facilitate the efforts of subcontractors to fabricate durable jigs and fixtures at a minimum cost and without special equipment of any type, Consolidated Vultee Aircraft Corporation has developed a new tooling technique.

This technique briefly involves the lamination of resin-impregnated fabric

materials on simple plaster forms. Similar processes have heretofore been developed for a number of interesting purposes but they have invariably necessitated the use of special equipment for mixing resins, impregnating laminae, applying heat and/or pressure, and so on.

Tooling which is fabricated by means of the new process has much less weight than the lightest metal tooling, has all the accuracy required to produce interchangeable parts and assemblies, is not susceptible to corrosion or changes in temperature, can be altered in conformity with various engineering specifications, and may be dropped from the roof of a two-story building without incurring the slightest damage. Such tools include drill jigs, trim fixtures, routing forms, and saw fixtures.

A number of polyester plastic resins can be used as adhesive impregnants in making the tools where special prop-



(Top) Cutoff fixture for sawing and trimming. (Center) Drill and trim fixtures. (Bottom) Routing Form.

Three coats of lacquer and one coat of separating wax are sprayed on the plaster splash to prevent sticking.

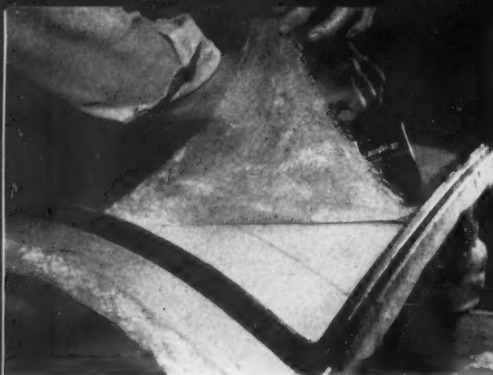
erties—such as high heat resistance and rubberlike flexibility—are desired in finished articles. However, Convair engineers prefer the MR-25C resin for most general purposes because; (a) Its viscosity is such that it can be readily mixed with a catalyst or

A wax edge strip is tacked to the plaster splash to establish the perimeter of the jig.

hardening agent by manual stirring in any clean container; (b) It is compatible with a variety of organic peroxide catalysts (such as benzoyl peroxide and t-butyl perbenzoate) so that its solidi-

Fiber glass sheets are cut to outside shape which has been traced from a pattern.





(Left) First fiber glass sheet is laid over plaster splash and brushed with polyester mix. (Right) Succeeding layers of glass cloth or matt are applied in the same manner until the required thickness is reached, generally about 5/16 of an inch.

fication time can be varied without the use of heat and pressure; (c) It is one of the few polyesters whose solidification is not inhibited by air, and will consequently set like plaster once it is mixed and used; and (d) Its use results in tools with good rigidity, extreme stability, and an unusually high

amount of flexural strength.

MR-25C polyesters are products of Marco Chemicals, Inc., at Sewaren, N. J. They are used by Convair as impregnants and adhesives for 182-A fabrics produced by Owens-Corning Fiberglas Corp., Toledo, Ohio.

Plaster forms for the tooling laminae

are made by splash-casting materials such as Hydrocal in accordance with standard foundry patternmaking procedures. Then each form is sealed with three spray coatings of lacquer and, if necessary, provided with wax edge strips to establish the lamination boundaries for the tools that will be produced.

A liquid wax product is applied to the lami-



The cured blank is lifted from the plaster splash. Curing times vary according to the setting resins used, shop needs for production speed, and the type of casting form.



Rough edges are smoothed by grinding.

its surfaces with a catalyzed polyester resin by means of an ordinary paint brush. The latter operation is usually accomplished after the laminae are respectively stacked on a plaster form. The number of layers of fabric used in laminating a given tool depends on the size and purpose of the tool. As a rule, this does not exceed four layers.

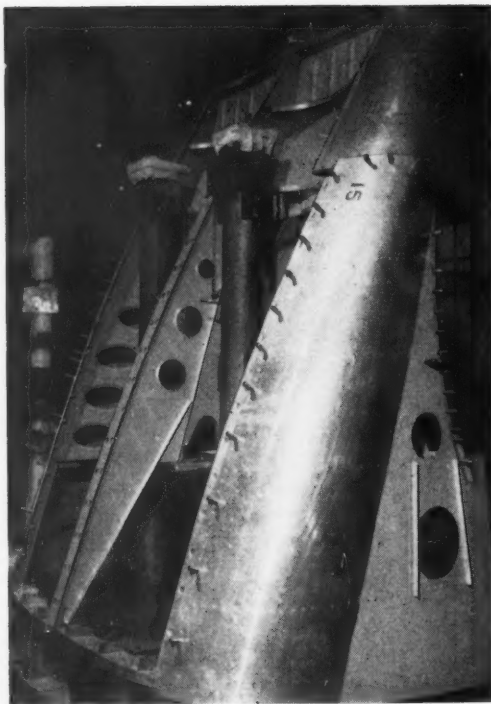
In most cases, the catalyzed plastic materials on the fabric laminae are

nation surfaces of each plaster form prior to the fabrication of each tool in order to prevent the adhesion of laminae to the plaster surfaces.

Glass fabric laminae are cut to the dimensions specified for individual tools by means of scissors, then each is impregnated by coating



Excess material is sawed out to reduce weight and facilitate the handling of the completed jig in the shop. With drill jigs, the blank is fastened to the form and guide holes drilled into the jig from the back. These holes are then drilled out and bushings are press fitted.



After body assembly with holes drilled and cage removed. The holes are coordinated with the pattern used to drill door assembly elsewhere.

in an hour or less with heat from ordinary light bulbs situated an inch or two away from the uppermost tooling surfaces.

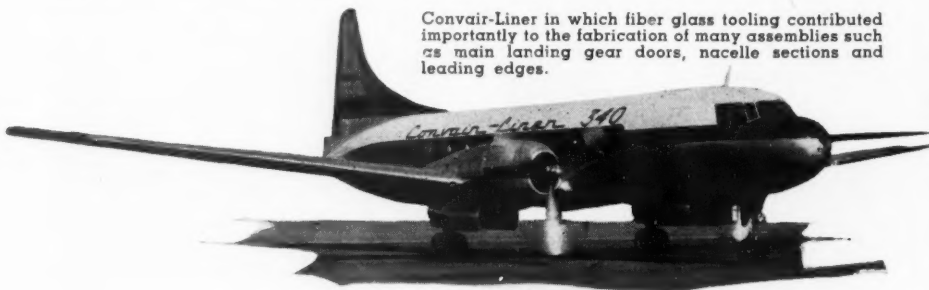
Laminate surfaces exposed to air during the curing interval are usually a bit rough; but, if necessary, they can be satisfactorily smoothed out with manual sanding and grinding tools.

Solidified tooling laminates can also be sawed, drilled, planed, shaped, and so on, where special details (such as bushed holes for drill jigs) are required. Specific procedures employed in this connection are indicated by accompanying illustrations.

allowed to solidify in open air at room temperature. Such solidification will normally take place in four hours.

Where it is desirable to shorten the curing interval, due to cold weather or unusual production requirements, the tooling laminates can be bonded

Metal inserts and parts adjacent to the laminated tooling surfaces are definitely not subjected to the sort of chemical action that promotes corrosion, although they may be lacquer finished or otherwise protected against atmospheric corrosion.



Convair-Liner in which fiber glass tooling contributed importantly to the fabrication of many assemblies such as main landing gear doors, nacelle sections and leading edges.

Drill cage is being laid over after body assembly of Convair-Liner 340 nacelle.



As previously intimated, Convair's laminated tooling is very difficult to damage. However, if damages should occur, the jigs and fixtures could be readily repaired by returning them to their plaster forms for supplemental lamination operations.

Similarly, many types of engineering changes can be incorporated in the tools without difficulty. For example, if it were desirable to change the location of a hole in a drill jig, the following procedure would apply: (1) Remove bushing from the hole that is

no longer needed; (2) Fill the latter hole with resin-impregnated fabric and allow it to cure; and (3) Drill new hole and press-fit bushing therein.

A dozen or more duplicate tools can be laminated, if necessary, with a single plaster form.

Material costs of the laminated tooling are relatively high, compared with the material costs (per pound) of metal tools. However, this is not a significant item in view of the fact that the laminates weigh only half as much as comparable metal tools—which represent a 50 to 75 per cent greater fabrication cost.



Positioned and clamped, drill cage guides drilling of holes for Cameloc fasteners.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.

# Timely Tips on Machining Stainless Steels

A brief look at some actual production problems and how they were solved.

By GEORGE J. STEVENS

Machining Engineer, Armco Steel Corporation

IT has been our experience during the past 15 years that, when stainless machining problems occur, the fabricator usually blames the material. Of course, this criticism may be justified at times because of the fact that stainless steels are a complete study in themselves. It is easy to see that when more than 30 different grades of these metals are fabricated into complicated machine parts, difficulties are bound to happen. Even so, most of these problems can be traced to other causes, such as improper use of machine tool equipment or lack of rigidity in a tool setup.

Stainless steels are made to rigid specifications in chemical analyses and physical properties, and because the

alloys are all different they will vary somewhat in performance. Moreover, the very nature of their composition makes for problems in heat dissipation, chip elimination, high cutting

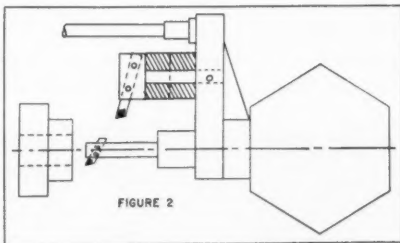


FIGURE 2

pressure, and other factors that shorten tool life.

Another important factor is condition. Material engineers specify stainless in the best condition for physical properties or maximum corrosion resistance, sometimes with no regard for its machinability. In most cases, a compromise can be made to use an FM grade, and thus reduce machining costs.

Furthermore, stainless steels vary

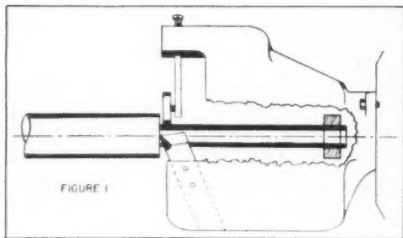
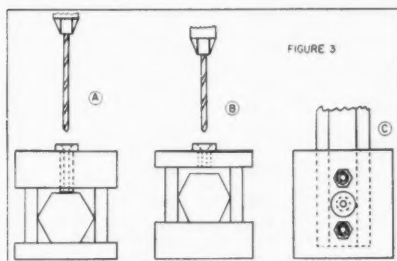


FIGURE 1

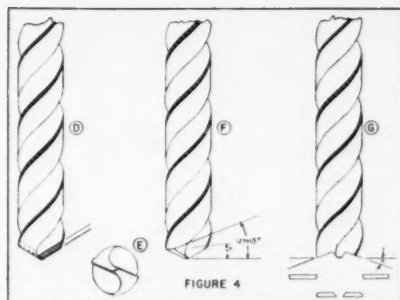
considerably in machining characteristics. This is why complete information concerning a particular type should be considered before fabrication. While this discussion is not intended to cover the various types of stainless steels, nevertheless it should be mentioned that the FM grades, with additions of sulphur or selenium, have excellent machining properties and rarely cause trouble. Types 416 (12 Cr FM), 303 (18Cr—8Ni FM) and 430F (17Cr FM) are the types most commonly used. Types 440F (17Cr—High Carbon), 347F (Cb-Ta), and 321 have



excellent machining properties when compared with regular grades 440 and 347, and should be used whenever possible. The 300 series are usually tough, yielding stringy chips. They also work-harden rapidly, especially when the tool rides without cutting. The Type 440 steels are highly abrasive because of their high carbon content.

Many shops are machining stainless regularly and a good many others work with stainless exclusively. They have learned how to overcome difficulties by the use of proper tools, heavy equipment, and by a basic knowledge of handling stainless with sound set-up practice.

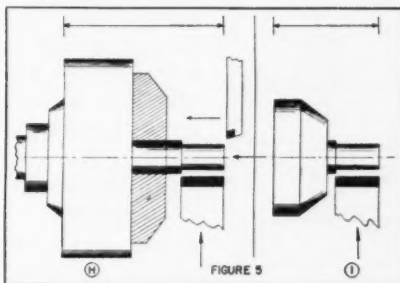
From visiting plants and talking over problems before actual production is started, we have been able to work



out some simple, effective work methods. Frequently they have proved the difference between success and failure.

Here are some of these actual service problems and the methods used to overcome them. It would be impossible to list all the modifications for various types of tools; however, several have been selected to illustrate simple changes made in existing equipment for additional rigidity and more efficient cutting.

Figure 1 shows a turret lathe box tool equipped with an inserting bushing for turning long sections. This added feature has the effect of maintaining straightness in a turned bar. The additional advantage of a chip-curler can also be noted. In this setup, cast alloy type tooling was used on Type 302 material. 125 F.P.M. is recommended with 0.0075 in. feed per revolution.



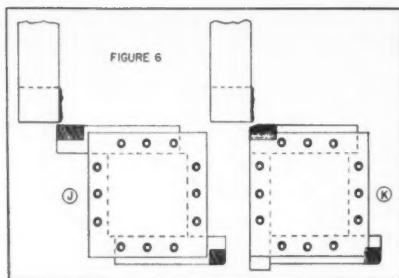
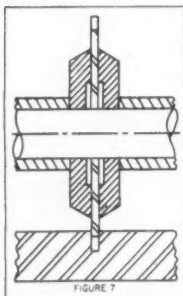


Figure 2 depicts a turret lathe setup which involves an application of multiple turning. This type of setup, as illustrated, is used in conjunction with one or more cutting tools. The cutting tool holders should be mounted as short as possible. However, when the type of operation prevents this, bushings of the type illustrated in Fig. 1, may be used to strengthen the cutter holder. Multiple turning heads, thus modified, have shown an increase in tool life, particularly with carbide tooling.

Drills should be kept as short as possible to minimize the torsional spring as the cutting edge forces vary. This spring action is more pronounced as the (L/D), length over diameter, ratio increases. For instance,  $\frac{1}{2}$  in. drill, 3 in. long has an (L/D) of 6 whereas a  $\frac{1}{16}$  in. drill,  $1\frac{1}{2}$  in. long has an (L/D) of 24. Therefore, to obtain reasonably

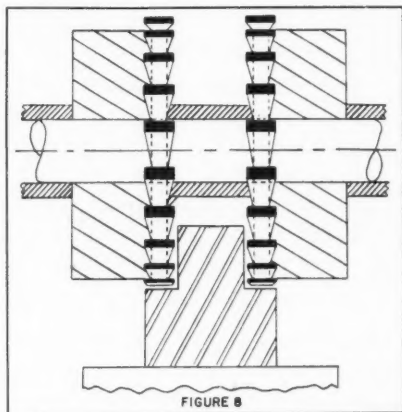
near the same performance the  $\frac{1}{16}$  in. diameter drill should be only  $\frac{3}{8}$  in. unsupported to have an (L/D) of 6.

Drill jigs should be designed with proper bushing lengths (2 times



the drill diameter) between the bushing and workpiece. In Fig. 3, drawing A illustrates improper bushing length with no provision for chip elimination, while drawing B represents proper bushing length with adequate chip space between the bushing and workpiece.

Drill bushings should not be used for holding the workpiece in position but, as shown at C in Fig. 3, the drill jig should be designed with adjustable locating studs.



In Fig. 4, drawings D and E show hook or chip curler grind incorporated in a drill cutting edge. This grind is particularly advantageous for the austenitic types of stainless steels (300 series) because it reduces the cutting torque and heat developed in drilling due to the greatly increased cutting angle and easy chip disposal characteristics.

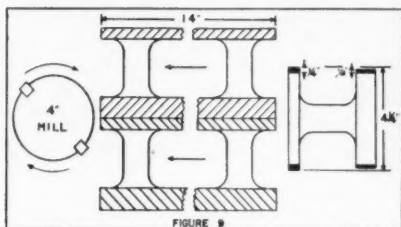
Drawing F shows a small flat ground on the drill. This is advantageous for small drill sizes ( $\frac{1}{16}$  in. diameter) because it prevents excessive cutting pressures exerted by large spindles of  $\frac{1}{2}$  in. capacity drill presses customar-

ily used for this type of work.

Drawing **G** shows the proper type of grind for drilling sheet material. The center tip should always project slightly below the cutting lips.

The setup at **H** in Fig. 5 is acceptable for turning operations, but for wide forming the rotating chuck works against the tool because of the considerable overhang. For wide forming operations the employment of a lathe collet, as shown at **I**, minimizes overhang.

Drawing **J** in Fig. 6 serves to illustrate the usual method of mounting carbide tools in a tool post turret.

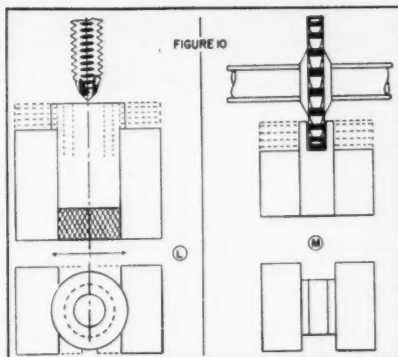


Drawing **K** shows a much improved method.

The slotting cutter illustrated in Fig. 7 has been backed up with heavy steel plates for the purpose of obtaining rigidity and added flywheel effect.

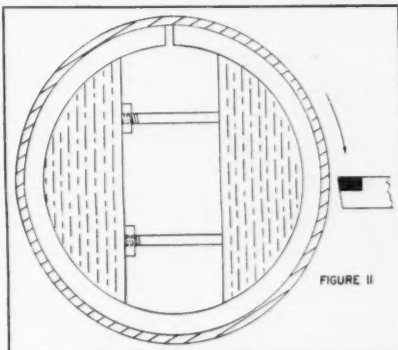
The straddle milling cutter shown in Fig. 8 is provided with heavy steel plates to back up the cutters. This feature produces rigidity for close tolerance work as well as the advantages of flywheel effect.

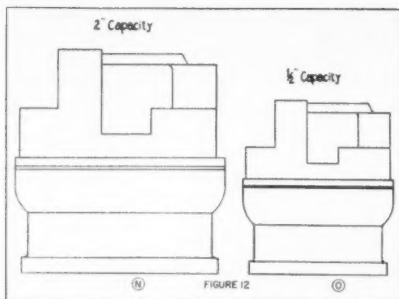
Figure 9 illustrates the advantage of mounting two castings back to back for a milling operation (carbide step mill). Milling of the two flanges of different height and width on one casting doubles the frequency of cutting impact and results in low tool life. When the castings are mounted back to back,



as shown, the uneven flanges act as a larger workpiece which increases rigidity and ease of machining. (Type 316 castings—485 F.P.M.—0.008 in. chip load).

In cutting thin sections of stainless steel, it is important to conduct the heat generated away from the tool as rapidly as possible. This can be done with additional metal placed in contact with the workpiece. Tapping or drilling of a thin section, as shown at drawing **L** in Fig. 10, can be done in a vise with additional metal provided as shown. Drawing **M** shows additional metal placed around a thin section in order to obtain heat dissipation from the saw.

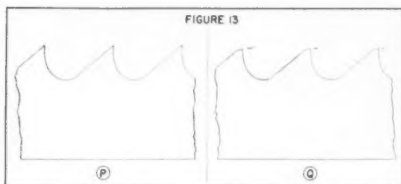




In conjunction with Fig. 10, conduction of heat can be accomplished in turning or boring thin sections by the use of additional metal placed inside the workpiece as shown in Fig. 11. Allowance should be made for expansion of the metal.

The size of equipment has an important bearing on the type of tooling to be used. A two-inch capacity machine, shown diagrammatically at N in Fig. 12, would be considered light equipment if it were loaded with two-inch stainless bars. High speed steel would be required in tooling. However, a one-half inch capacity machine, as illustrated by drawing O, would be considered heavy equipment when loaded with  $\frac{1}{4}$  in. bars and cast alloy or carbide tooling could be used.

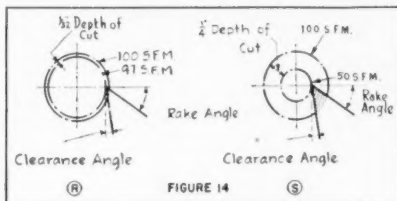
Eighty per cent of screw machine shop work is on non-ferrous material and, as a consequence, the present equipment is designed for non-ferrous alloys. It is important, therefore, that the equipment is strong and rigid



enough when stainless steel is to be machined.

Drawing P in Fig. 13 illustrates a conventional reciprocating saw blade, and drawing Q a blade with a 5 to 7 deg. land ground on the teeth. This land produces the same effect as backing up milling cutter teeth. It is especially desirable for sawing high temperature alloys.

Contrary to popular belief, light depths of cuts reduce tool life by excessive heat. Drawing R in Fig. 14 depicts a  $\frac{1}{32}$  in. cut where the surface feet per minute is from 97 to 100, the tip of the tool cutting at the rate of 97. In drawing S, with a  $\frac{1}{4}$  in. cut, the

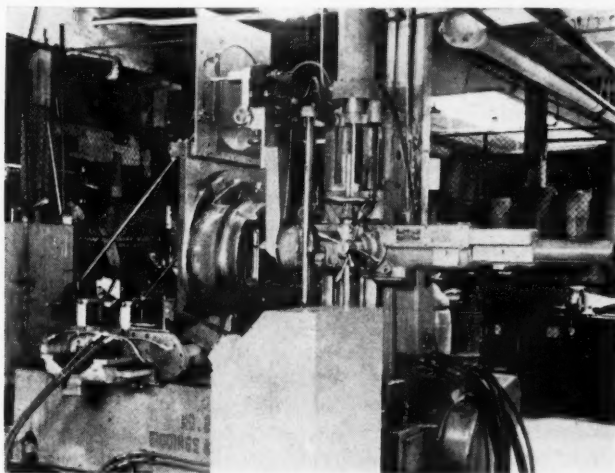


tool will cover 50 to 100 surface feet per minute, the tip of the tool covering 50. During the  $\frac{1}{4}$  in. cut, the tip of the tool, which is the weakest section of the cutting edge, will generate less heat than it will during the  $\frac{1}{32}$  in. cut because of the lower surface feet per minute at the tip. More total heat is generated during the  $\frac{1}{4}$  in. cut, but here the section of the tool that is cutting at a rate of 100 feet per minute is more massive than at the tip. Therefore, it can dissipate the heat away in addition to being stronger at that point. This is why increase in depth of cut lengths tool life.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

# "Specials" For Production

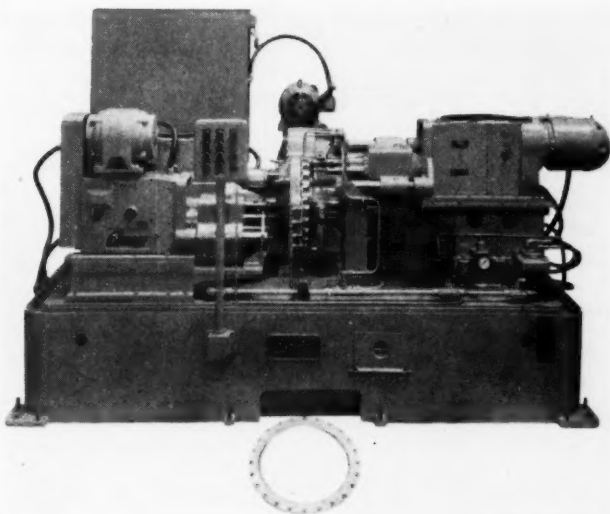
## Converted Boring Mill Machines Periscope Opening in Tank



**T**HE accompanying illustration shows how a standard horizontal boring mill, converted to automatic operation by a Turchan hydraulic duplicator, is used to machine a periscope opening in a "Bulldog" tank turret. A time saving of 50 per cent is claimed to be accomplished with the required 0.002-inch tolerance easily held.

## Special Machine for Producing Tank Clutches

**F**OR the purpose of producing tank clutches, The Avey Drilling Machine Co., Cincinnati 1, Ohio, has built this 12-position automatic indexing trunnion type machine, which is arranged to drill 24 holes to 13/32-inch diameter, remove burrs on both sides of the drilled holes, counterbore 24 holes, mill 12 notches to depth, end mill two notches, and end mill three additional individual notches.



# Cutting Costs by Practical Dimensioning

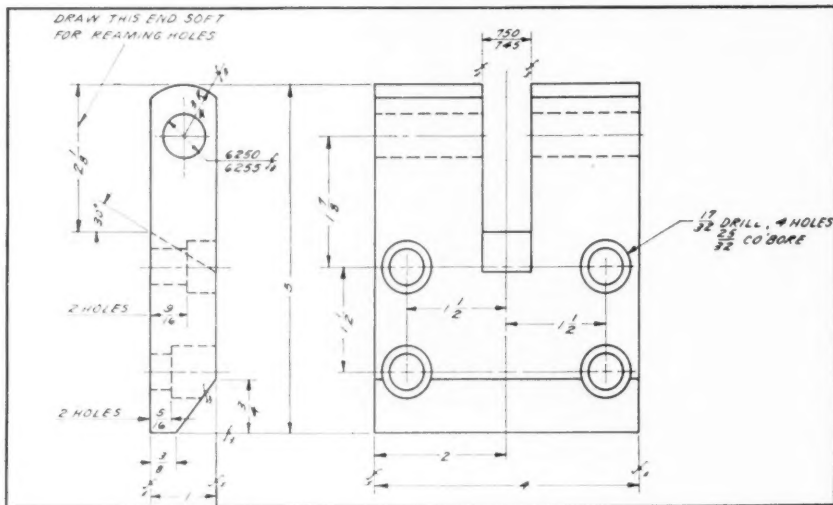
Tool manufacturer proves time and material savings possible with properly dimensioned drawings.

By E. C. HELMKE

MANY thousands of words have been written in various textbooks on mechanical drawing on the subject of dimensioning a drawing. The weight of dimension lines, size of letters and figures, size of arrow heads, and so on, have all been set forth in minute detail.

Attention to these individual details results in beautiful neat drawings, too many of which unfortunately fail to serve the prime function of a drawing, which is to tell the shop man exactly how to make a part that will function satisfactorily, that will be interchangeable-

Fig. 1—Example of the usual method of dimensioning a drawing.



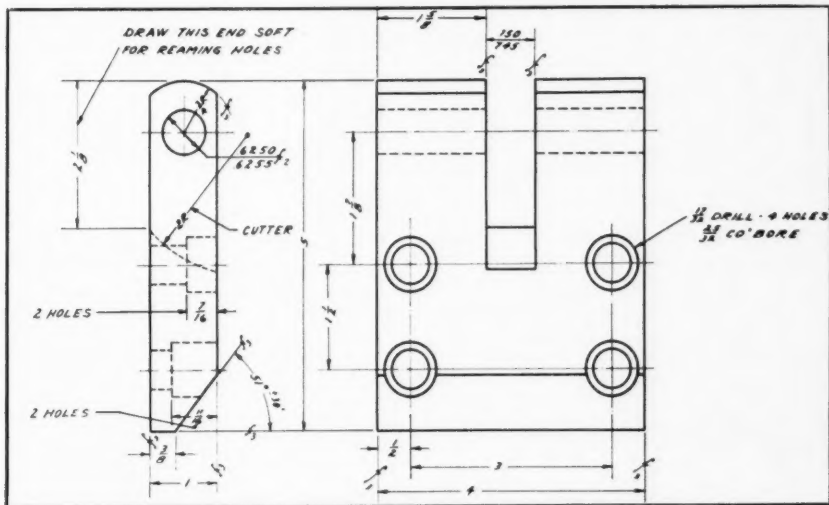
quently not much money can be spent for tooling.

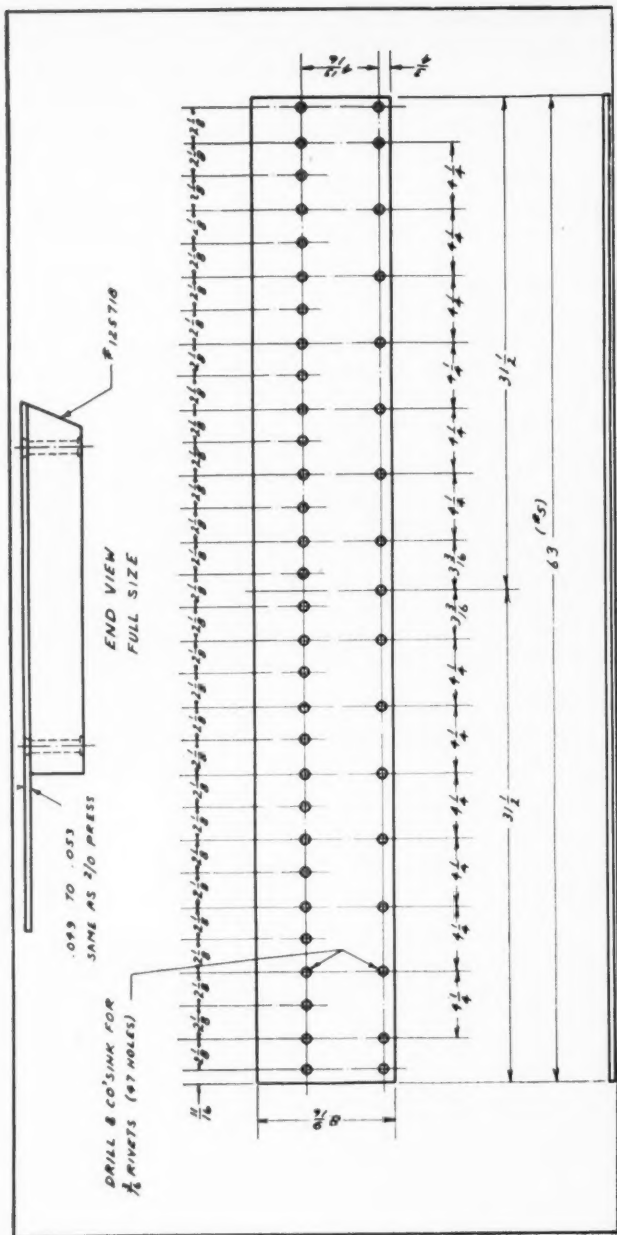
With the horizontal spacing of the bolt holes dimensioned as shown, a total spacing variation of plus or minus 1/32 inch could result which would take up all the clearance provided by drilling the bolt holes 1/32 inch oversize. Then when this spacing variation is applied to both rows of holes, with the possibility on the variation existing in both directions, it can readily be seen that the bolt holes will never fit the previously drilled and tapped holes in the mating part. If the holes are made to fit by slotting one or more of them slightly or by filing the bolts, assembly costs are increased, and it would be impossible to make a replacement part that would fit.

With the depth of the counterbores for the bolt holes dimensioned as shown, the machinist must subtract dimensions which introduces another possible source of error. The bottom

To illustrate some of these dimensioning errors, let us consider the cast iron stop block shown in Figure 1. Much of the machining on this block is for appearance only. The angle at the lower end of the block is for clearance, and the slot in the upper half of the block supports the pivot point of an air cylinder. This block is made in rather small quantities, and conse-

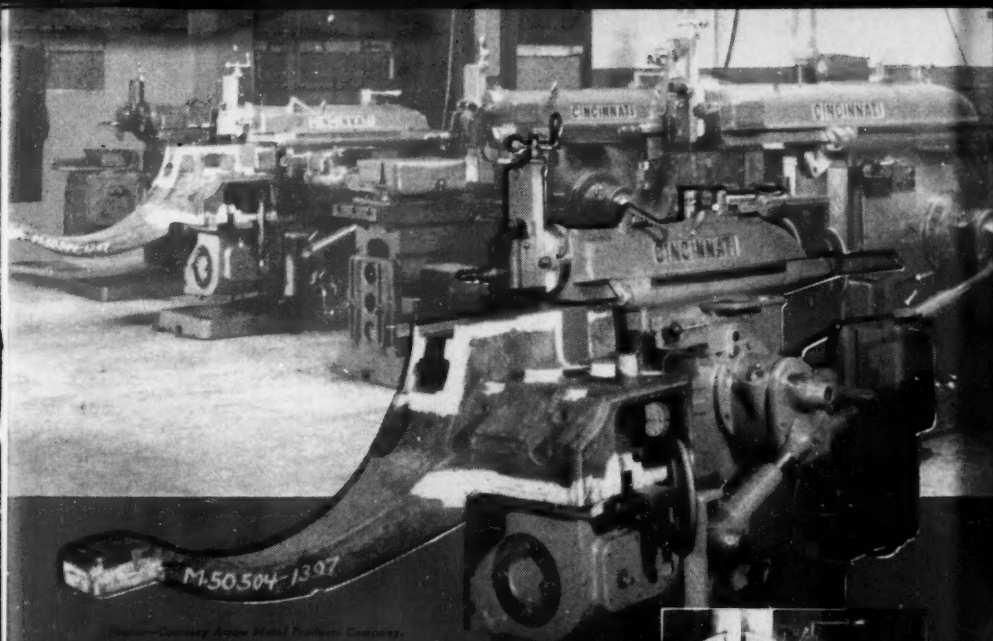
Fig. 2—Example showing recommended method of dimensioning drawing.





of the  $\frac{3}{4}$  inch wide slot is shown as a 30 degree angle. To machine this angle, a complicated angular setup is required on the milling machine. However, the bottom of this slot is for clearance only, and consequently could just as well be shown with a radius. Drawn in this manner, the block could be held in a horizontal position in the milling machine vise.

The clearance angle at the bottom of the block being dimensioned as shown makes it necessary for the machinist to either calculate this angle, or to arrive at the proper setting by cut and try. Both methods result in increased cost and the possibility of

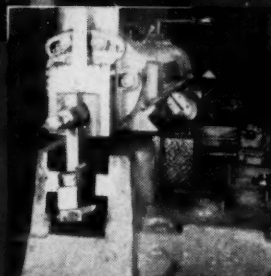


*Photo—Courtesy Arrow Metal Products Company.*

## small investment— **BIG JOB**

*Cincinnati Shapers can be profit builders for you. Write for Catalog N-5 for full information.*

An unusual  
undercutting  
operation



These large sidearms for stamping presses are machined on Cincinnati Shapers very profitably and efficiently, for two reasons—low investment and accurate, speedy performance.

This battery of rigid, powerful Cincinnati Shapers at Arrow Metal Products Co. is equipped with the Electro-Magnetic Clutch for speed and dependable operation. Modern controls are conveniently located for the operator, and also contribute to efficiency.

# THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES



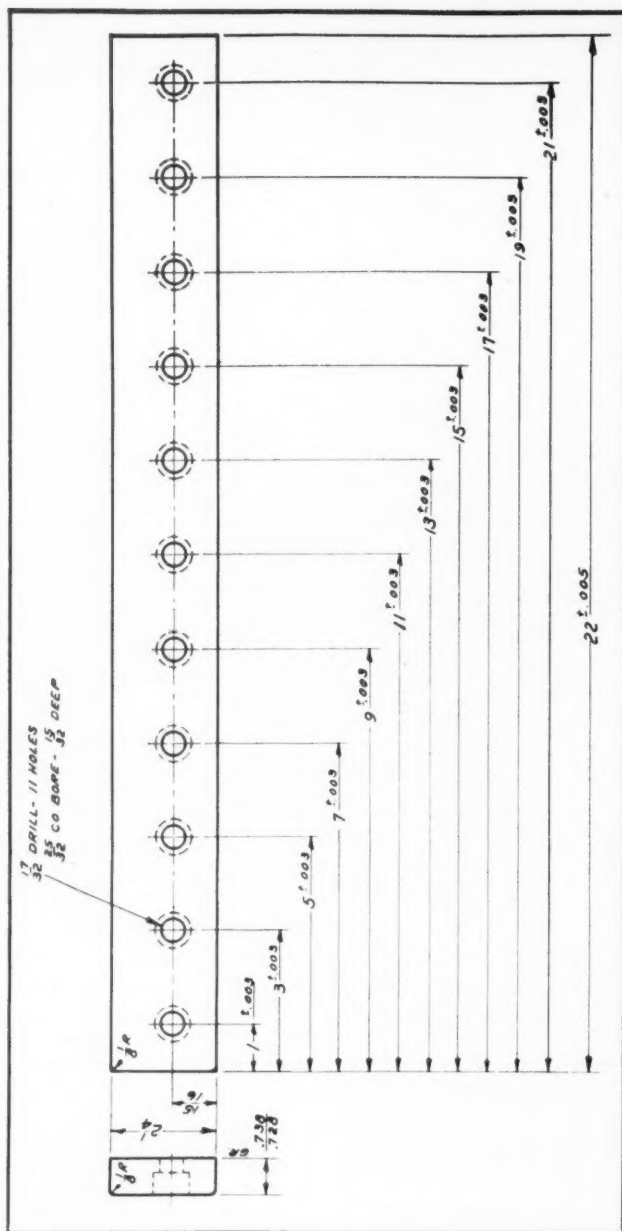


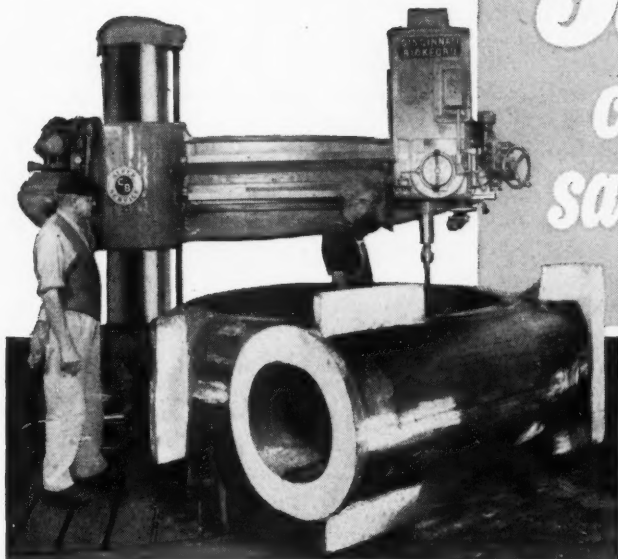
Fig. 4 — Illustration showing recommended method of dimensioning a series of holes.

errors. Also, since the  $\frac{3}{4}$  inch wide slot has not been positively located from one side or the other of the block, it could be off location enough to cause binding at the pivot point.

In Figure 2 this part has been redrawn, and the dimensioning has been changed to correct these errors. The total possible horizontal spacing variation of the bolt holes has been reduced from plus or minus  $\frac{1}{32}$  inch to plus or minus  $\frac{1}{64}$  inch. In addition to showing a radius at the bottom of the slot and giving an angular dimension for the clearance angle, the depth of the counterbores has been dimensioned directly, and the horizontal position of the

**This BICKFORD effected a**

**35%**  
*cost  
saving!*

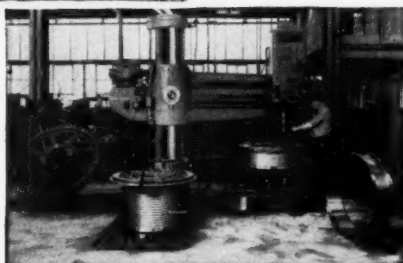


Drilling large centrifugal dredge pump housing. This 7' arm, 19" diameter column Cincinnati Bickford Super Service, equipped with triple base, allows setup of two jobs while the third is in process.

The efficient drilling department at the National Supply Company of California effected a 35% cost reduction in drilling operations with this Cincinnati Bickford Super Service Radial Drill.

Here the many feeds and speeds of the Cincinnati Bickford Super Service Radial Drills—and their rigid construction—combined with their easy operation—handle a variety of heavy duty jobs with outstanding dependability at low costs.

Write for Booklet R-29 on these powerful, accurate Cincinnati Bickford Super Service Radial Drills.



Drilling and tapping a clutch housing. Note the second housing ready for drilling on one of the triple bases of the machine. No time lost in setup.

*Photos—Courtesy of National Supply Co., Torrance, Calif.*

**CINCINNATI  
BICKFORD**



**RADIAL AND UPRIGHT DRILLING MACHINES**

**THE CINCINNATI BICKFORD TOOL CO.**

Cincinnati 9, Ohio U.S.A.

slot has been located positively.

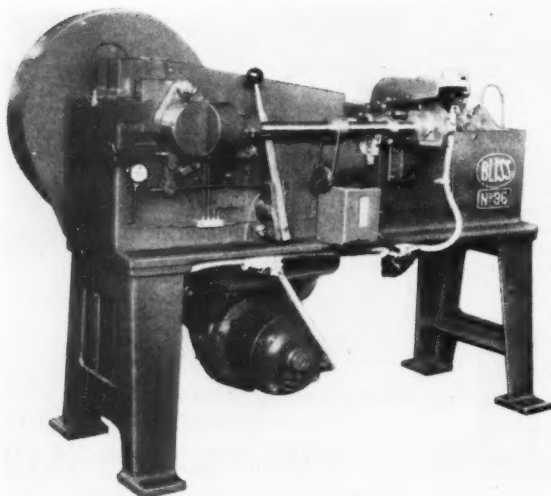
An additional change in the block that should be made, constitutes a fifth factor. This factor could perhaps be more properly designated as a design error or as an error in judgment, and can best be described in the following manner: Since this is merely a stop or support block, it is not essential that the block be exactly 1 inch thick and 4 inches wide. The block would perform its function just as well if it were only  $\frac{3}{4}$  inch thick and  $3\frac{3}{4}$  inches wide. In this latter case, the block could have been made from 1 x 4 inch steel instead of having to be made from  $1\frac{1}{4}$  x  $4\frac{1}{4}$  inch steel. This would have saved approximately  $1\frac{3}{4}$  lbs. of steel per block, and would reduce the amount of stock to be removed by more than half, thus reducing the machining time. In other words, great material and time savings are

possible on simple stop blocks, collars, and so on, on which one or more of the outside dimensions are not critical, if these dimensions are chosen so that the part can be made from the nearest size stock bar or extrusion.

Figure 3 shows a most obvious example of the accumulation of tolerances that can result from "chain dimensioning." These parts are made in very small quantities, and when dimensioned as shown, the machinist, in laying out the horizontal spacing for the holes, would set his dividers for  $2\frac{1}{4}$  inches, and would then step off the 29 spaces to locate the holes on the upper center line. If he missed the divider setting by only 0.005 inch, the total cumulative error by the time the last hole was reached would be 0.145 inch. The 0.005 error in setting the dividers would not be unusual since the workman would be setting his divid-

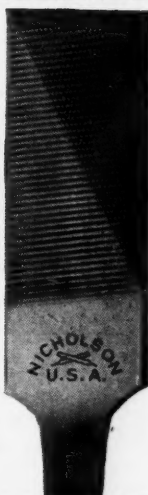
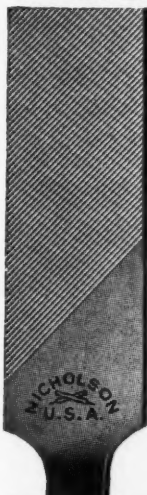
---

### Press for Piercing 20 MM. Cartridge Cases



**D**EVELOPED by E. W. Bliss Co., Canton, Ohio, the horizontal piercing press shown herewith is designed specifically for piercing the flash hole on brass or steel 20 mm. cartridge cases. This five-ton capacity press pierces the hole in one case per stroke and operates at 60 strokes per minute. It is equipped with a hand-filled chute feed with three stations. The first station is a detector to check the position of the case in the chute; the second is the work station; and the third is a detector to check the correct piercing. The first and third stations have solenoid switches.

## American Optical SPEEDS PRODUCTION with "The right file for the job"



**LATHE FILING** (upper) housing part of Micro-Surfacer with the Nicholson Long Angle Lathe File (left). Long angle of teeth "slides" chips down and out—minimizes filling up and scratching work.

**REMOVING BURS** (lower) from brass lens-coating plate with the Nicholson Brass File (right). Special tooth construction breaks up filings and prevents file from running off the work.

American Optical Company's recently developed Universal Micro-Surfacer offers new heights of accuracy and speed in the production of prescription optical lenses.

Properly shaped, accurately cut, uniformly hardened Regular and Special Purpose files are necessary for many of the hand finishing and fitting operations involved in its construction and that of other American Optical products.

Does the manufacture of *your* products call for fast or precision filing — on brass, aluminum, babbitt, plastics, stainless steel, die or foundry castings,

lathe work? Nicholson has *The right file for the job*, in the highest quality.

**Sold through Industrial Distributors**

**FREE TECHNICAL BULLETIN** on "TEN SPECIAL FILE TYPES."



**NICHOLSON FILE COMPANY**

48 Acorn Street  
Providence 1, R. I.  
(In Canada, Port Hope, Ont.)



**NICHOLSON**  
...a file for every purpose

ers to a 6 inch scale graduated in 64th of an inch.

Figure 4 shows a recommended method of dimensioning a series of holes. Here all dimensions are given from the left hand end of the part. All dimensions are actual readings and no addition or subtraction of dimensions is required. Consequently, no tolerances can accumulate, the possibilities of shop errors has been greatly reduced, and the part can be made inexpensively and will be interchangeable.

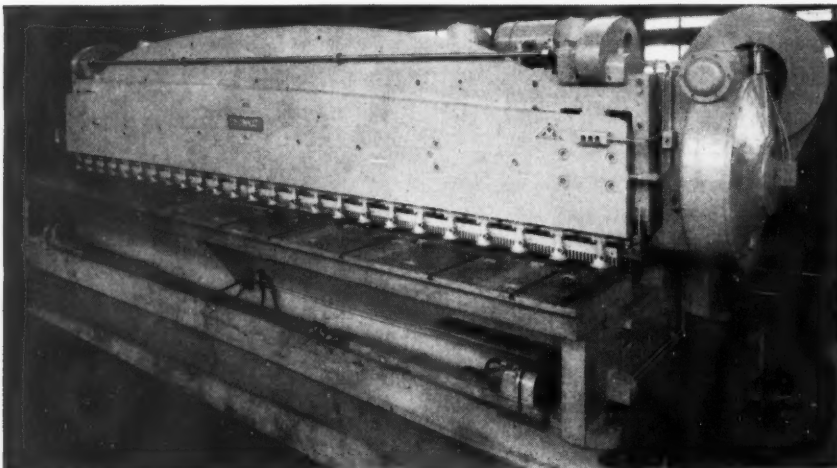
Problems of this type are thoroughly discussed in the 40-page booklet PRACTICAL DIMENSIONING. As a

service to industry a single sample copy of this booklet will be mailed free to anyone writing in on a business letterhead. Additional copies are available at a nominal charge. Write directly to The Gisholt Machine Company, 1221 East Washington Avenue, Madison 10, Wisconsin.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.

### Huge Squaring Shear for Aircraft Production

**B**ELIEVED to be the longest squaring shear produced in the U. S. A., this Cincinnati All Steel Squaring Shear, capable of cutting 24 feet of 1/4-inch mild steel plate, was manufactured by The Cincinnati Shaper Co., Cincinnati 25, Ohio, for the Douglas Aircraft Company for use at Lakewood, California. The shear weighs approximately 149,000 lb. and has a cutting cycle of 20 strokes per minute. The hydraulic hold-downs are capable of exerting a pressure of more than 22 tons for firmly holding the work. Additional features of the machine include a 24-inch throat or gap, 48-inch back gage range, light beam shearing gage, and air clutch control equipped with two foot valves.

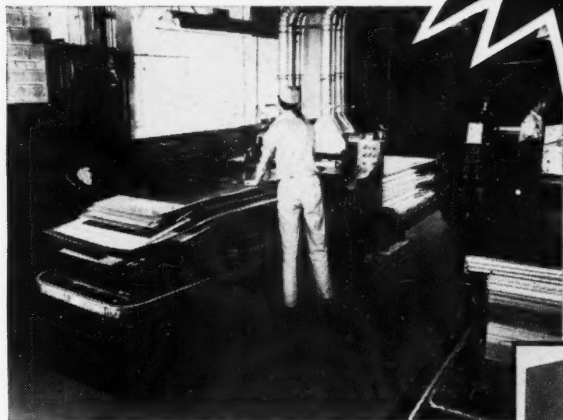


# PORTELVATOR<sup>®</sup>

SHEET FEEDING METHOD  
IMPROVES MANUAL

## effectiveness

# 800%

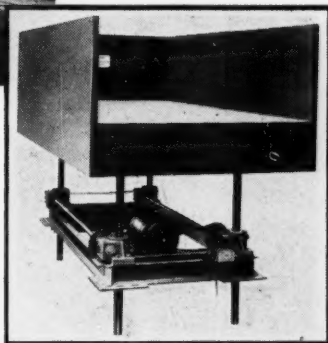


Portelvator material positioning units in operation.

Portelvator material positioning equipment supplementing micro grinders on plastic sheet sanding, produces astounding increase in manual effectiveness with corresponding benefits to production and production costs.

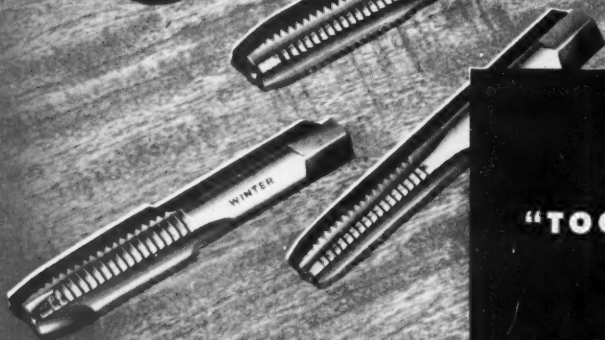


**THE USER'S OWN STORY** with detailed descriptions of before and after operations. It is a case history which could be the answer to your headache. Write for a free copy of **editorial reprint No. 5228.**



Portelvator material positioning unit before installation.

 **THE** *Hamilton* **TOOL COMPANY**  
828 SO. NINTH STREET • HAMILTON • OHIO • U.S.A.



# WINTER

## NEVER "TOO LITTLE, TOO LATE"

Your local Industrial Supply Distributor performs a valuable service to industry by stocking the sizes and types of WINTER Taps that you and his other customers are most likely to need. He is always ready to serve you—as close to your tapping problems as the telephone on your desk.

**WINTER BROTHERS COMPANY**  
Rochester, Mich., U.S.A.

Distributors in principal cities. Branches in New York, Detroit, Chicago, Dallas, San Francisco. Division of National Twist Drill & Tool Company.

**ASK FOR  
NATIONAL  
COUNTERBORES**

For ruggedness, permanent alignment,  
and economy be sure to ask for  
**NATIONAL** Counterboring and Spot-  
facing Tools.

**NATIONAL TWIST DRILL  
& TOOL COMPANY**

Rochester, Mich., U.S.A.

Distributors in principal cities. Factory Branches:  
New York, Chicago, Cleveland, Detroit, Dallas,  
San Francisco



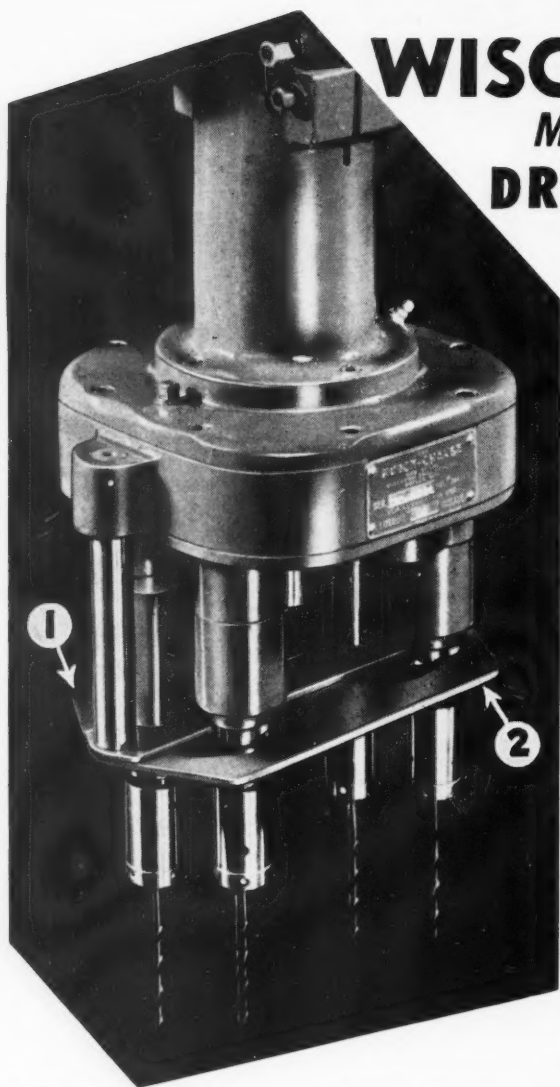
**CALL YOUR  
INDUSTRIAL SUPPLY  
DISTRIBUTOR**

for all your staple industrial needs,  
including **NATIONAL** Twist Drills, Reamers,  
Counterbores, Milling Cutters, End Mills,  
Hobs, and special tools



*National*





# WISCONSIN

## *Multiple* DRILL HEADS

### **Adjustable and Fixed-Spindle Types**

Adjustable Spindle Heads have Dual Positioning Plates for fast, accurate set-ups that "stay put".

Positioning and Locking Templates are furnished for each bolt circle or hole pattern . . . to your exact specifications.

Half-hole Positioning Plates (1) make it easy to swing spindles into place quickly. Locking Plates (2), with full holes, are mounted on support posts to lock set-ups securely against shifting.

6 Capacity Ranges . . . from "Light Duty" to "Extra Heavy Duty". Standard Models have 2 to 8 spindles. Special Models built to order.

**1. Half-hole Positioning Plate.**

**2. Locking Plate has full holes to hold spindles in place.**

Send print of Hole Pattern for estimate.

## **WISCONSIN DRILL HEAD CO.**

4985 N. 124TH ST. • BUTLER, WISCONSIN



**Safest,  
Straightest-Cutting,  
Most Durable Blade Ever Made**

# Starrett

## SAFE-FLEX HIGH SPEED WELDED EDGE POWER HACKSAW BLADES

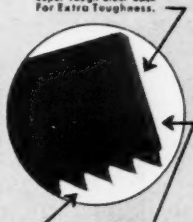
### IT'S SHATTERPROOF!

**D**ouble welding makes Starrett SAFE-FLEX Power Hacksaw Blades the safest, straightest cutting, long-lasting blade ever made. Use it with complete safety for your toughest cutting jobs — for multiple sawing work or interrupted cuts. Use it with greater economy for *all* your power cutting. Step up the speed and feed. Watch it cut clean and fast with no danger of shattering.

Double welded construction, an entirely new development in hacksaw design, gives Starrett SAFE-FLEX blades the perfect combination of hardness and toughness. The cutting edge of hard, high speed steel is reinforced with a medium hard, extra strong center and backed up with a super-tough steel back. See what the new Starrett SAFE-FLEX blade can mean to you in more and straighter cuts per blade. Order a supply today.

### Here's what DOUBLE-WELDED SHATTERPROOF CONSTRUCTION MEANS

Super Tough Steel Back  
For Extra Toughness.



Hard "High Speed"  
Edge For High Production — No Tooth  
Stripping.

Medium-Hard Steel  
Center For Extra  
Strength.

**Starrett**

TRADE MARK

REG. U.S. PAT. OFF.

**SINCE 1880**

**WORLD'S GREATEST TOOLMAKERS**

**THE L. S. STARRETT COMPANY**  
Athol, Massachusetts, U. S. A.

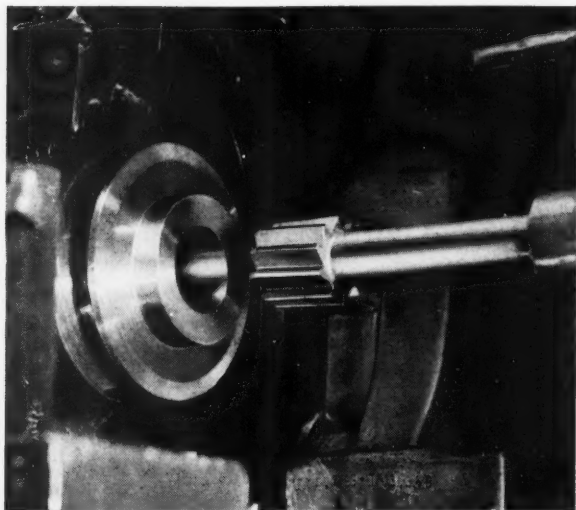
---

MECHANICAL HAND MEASURING TOOLS AND PRECISION INSTRUMENTS  
DIAL INDICATORS • LEVEL TAPES • PRECISION GRINDING FLAT STOCK  
HACKSAWS, BAND SAWS and BAND KNIVES

**Buy  
THROUGH YOUR  
INDUSTRIAL  
DISTRIBUTOR**

---

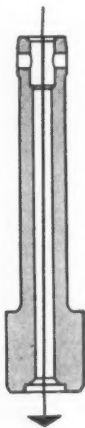
• Prompt delivery  
• Dependable service  
• Quality products



## **REAM FINE FINISHES ON SCREW MACHINES AND TURRET LATHES**

### **20-25 micro-inch finish**

Reamed finishes which were never considered possible are now obtained on production jobs with Barber-Colman Oil-Feed Reamers. On this job, 1000 pieces were reamed to a surface finish of 20-25 micro-inches before it was necessary to sharpen the reamer. The feed is 1.75" per minute at 280 RPM, requiring 30 seconds to ream the 7/8" length of cut. The material is AISI C 1137 steel. Finishes like this can be obtained in regular production with Barber-Colman Oil Feed Reamers.



### **oil feed**

An outstanding feature of these oil-feed reamers is that the oil feeds through the body of the reamer to flush the chips away from the cutting area. Other types of reamers tend to pack the chips in front of the reamer, increasing the chance for "pick up" which often ruins the finish and shortens the life of the tool. As the oil hits the end of the hole, it is forced back between the flutes, carrying the chips with it. Another aid to extending tool life is that the oil reaches the cutting area on jobs which could not otherwise effectively employ

**D E S I G N E R S   O F   S T A N D A R D   A N D   S P E C I A L**

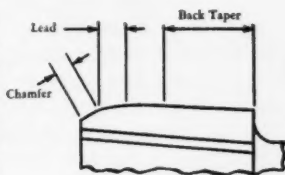
### Irregularly-spaced flutes

Irregular spacing is a standard feature of all Barber-Colman Oil-Feed Reamers. This type of spacing provides a smooth cutting action and fine finish and prevents the reamer from forming "welts". Thus, the design of the spacing in conjunction with the oil-feed feature allows these reamers to produce surface finishes which formerly required a secondary finishing operation. To aid in checking the reamer diameter, the flutes are spaced diametrically opposite each other so that they can be inspected with a micrometer.



### cam-controlled sharpening

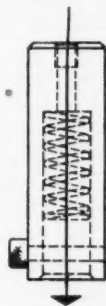
The profile form on the reamer flutes is important in obtaining the best finish and tool life. Following a 30° chamfer, the lead is blended into a radius and followed by a straight portion which iron out the feed marks. This combination produces exceptionally fine finishes. Also, through the use of the Barber-Colman system of sharpening, a theoretically sharp cutting edge is produced rather than a cylindrical land. The Barber-Colman system is cam-controlled so that each reamer is sharpened with exactly the same profile. These are features which are available in no other type of reamer.



### self-centering floats

These spring-type floats hold the reamer firmly, eliminating any sagging. Its simple design, consisting of only the holder, drive pin and spring, makes it easy to operate and maintain. An opening through the center of the float allows the oil to reach the reamer. Only two floats are required to cover the complete range of sizes, although a float of extra length is available for the larger sizes. These reamers are available for diameters of .344" through 1.380".

Ask for new bulletin listing specifications and prices or call your nearest Barber-Colman representative.



HOBBS • CUTTERS • REAMERS  
HOBGING MACHINES  
HOB SHARPENING MACHINES



**Barber-Colman Company**

GENERAL OFFICES AND PLANT, 919 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

M E T A L   C U T T I N G   T O O L S   S I N C E   1 9 0 8

# More Production Through Better Understanding of Machinability

Excerpts from the author's outstanding paper presented at the ASTE Twentieth Annual Convention.★

By K. R. BLAKE

Vice President and Consulting Physicist, Metalloid Corporation

**I**NCREASING production and reducing costs hinges largely on the possibility of increasing tool life. The life of a tool is usually considered to be the volume of metal it removes before dulling to a specified extent, beyond which it no longer cuts satisfactorily. In any machinability evaluation the tool life factor is usually considered to be the most important consideration. It is tool failure that constantly inspires the tool engineer and machine designer to attempt to find new machine and tool designs, which will lengthen the useful life of the tool and produce a superior quality of product.

The failure of a cutting tool is commonly recognized to be the result of the heat which is generated in the cutting operation and has the effect of reducing the hardness of the tool. This mechanism of failure can easily be seen by a visual examination of a tool, which has been used until it has failed. It would seem, therefore, that if we

are to improve tool life, we should consider the control of the heat, which is truly the direct cause of tool failure.

In any metal cutting operation, the quantity of heat produced is equal to the net horsepower per cubic inch per minute minus the increase in internal energy of the part. The heat thus produced is distributed in three ways: in the chip, the tool, and the workpiece. The proportion in which this distribution takes place is determined by the velocity of the cut, the cross sectional area of the cutting edge, the shape of the tool and the cutting fluid used. The actual quantity of heat, referred to as BTU's per cu. in., is determined by the free energy of the metal and the velocity and feed of the cut. It was stated earlier in the paper that metals having the lowest free energy require the greatest amount of energy to produce rupture.

Annealing of the cutting edge precedes the failure of the tool, therefore it becomes necessary to utilize every means possible to prevent the BTU's per min. from reaching a point sufficiently high to cause failure of the cut-

★ The accompanying excerpts from Mr. K. R. Blake's paper "Dynamomics—A New Concept in Metal Removal" are presented through permission granted by the American Society for Tool Engineers.

Fig. 1—Energy impact distribution as affected by area impactor.

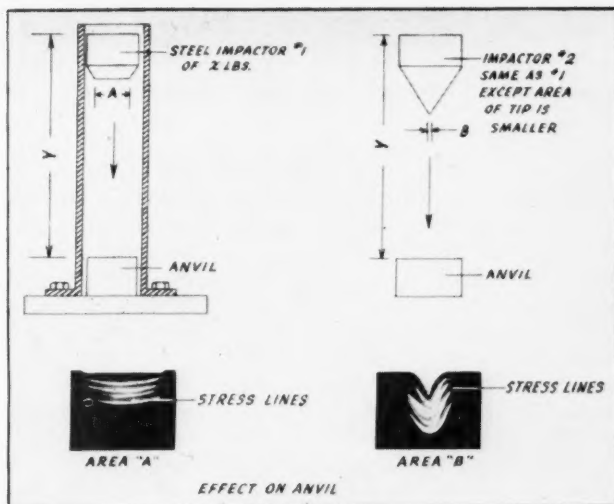
ting edge. The threshold free energy in the metal is the major factor in this process. Let us, therefore, consider ways of increasing the free energy in order to decrease the heat produced. This can be accomplished in two ways: (1) By

the use of suitable heat treatment, wherein the atoms and crystals are rearranged so that the overall internal energy of the part is increased, and (2) By the use of fluids or other suitable chemicals which have the property of increasing the internal energy of the metal at the rupture point.

The first method is not satisfactory for all types of metals, since the desired physical properties may not be maintained if the metal is subjected to heat treatment capable of increasing its machinability. The latter method can be satisfactorily utilized without fear of modifying the physicals of the metal, and can be applied at the time the cutting process is taking place. Let us now consider velocity, area of contact and tool shape as effecting the distribution of the heat produced in the cutting operation.

#### Velocity and Area of Contact

The rupturing of metal from a process of deformation is a time and energy



function. Every metal and alloy has a certain critical energy per unit-area tolerance, which must be exceeded before rupture can take place. Any excess of energy beyond this tolerance will cause immediate separation of the structure. The critical rupture energy is the amount of energy necessary to raise the atom to an energy level high enough to allow it to separate from the electron field of the adjoining atoms. In acquiring this increased energy level, the atom will tend to increase its radius of movement and in so doing will displace the adjoining atoms from their respective positions. If this condition is allowed to take place, the overall energy required to produce rupture would be increased as the number of atoms being moved is increased. Therefore, the total number of BTU's produced in the process would also be increased.

The time factor in the machining process is the velocity or the surface feet per minute with which the cut is

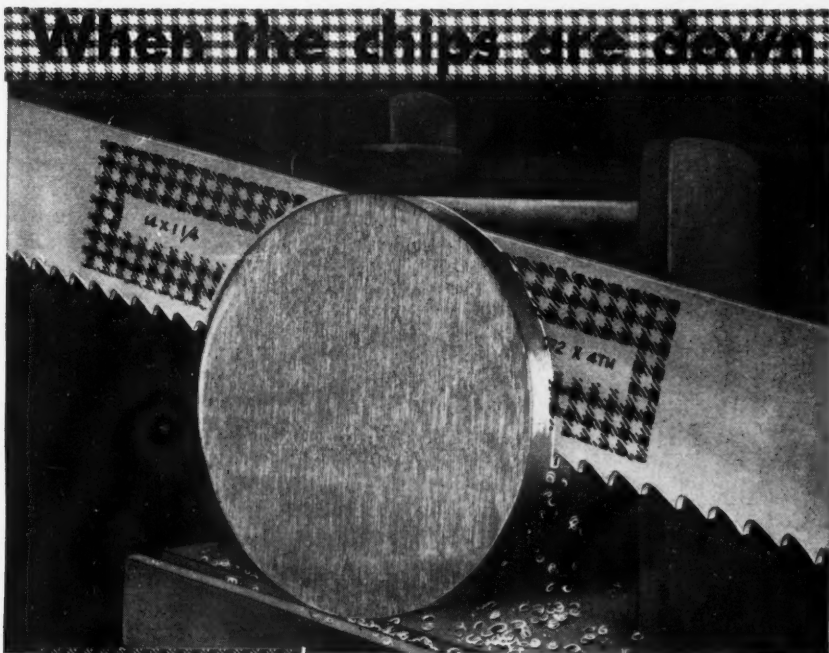
taking place. By increasing the velocity of the cut we are reducing the time in which the atom can move from its original position to one of higher energy. The distance through which the atom moves will be greater if the metal is hot, than if it is cold. Consequently then, the total number of atoms taking place in the deformation and rupture process under this condition will be greater than if the metal is at a lower temperature. It does not follow, however, that the total amount of energy necessary to produce deformation and rupture is greater in this case, since the initial threshold energy of the metal itself is higher if the temperature is elevated. Therefore, a smaller quantity of energy must be added to the metal in order to take it beyond its rupture point. This phenomenon has been observed in machinability tests, which have been conducted on test specimens heated up to 1100 deg. F.

If the velocity of the cut is sufficiently high, the atomic movement is limited to those atoms immediately adjacent to the separation area. In this case, the BTU's per cu. in. are greatly reduced. This effect is noted in better quality of surface finish, lower internal stress in the workpiece, which is evidenced by less distortion and greatly increased tool life. One of the common applications of this principal is known as "high-speed milling," where the actual cutting speed is in excess of 500 sfpm. It has been found, however, that the rate of feed of the work into the cutter and also the shape of the tool is highly important to the success of this operation. These factors and their relationship will be discussed later in the paper.

The term "area of contact," is used primarily with reference to the edge of

the cutting tool, although it may also be considered as that area of the work over which the energy of the cut is dissipated. We have previously stated that it is desirable to limit the number of atoms taking part in the separation process to as few as possible in order to reduce the overall quantity of heat produced. In addition we have described the effect of velocity on this particular factor. If the relationship of area of contact to time is considered, we find that if the energy and time remain constant and the area of contact is allowed to increase, the total quantity of energy available will now be distributed over a correspondingly larger number of atoms than before, and will therefore have the simulated effect of reducing the velocity. Under this condition we would find a greatly increased quantity of heat produced and also a greater quantity of energy adsorption in the workpiece, which would be manifest by distortion and increased temperature. This relationship can be observed by considering the analogy of dropping a weight of given mass and cross sectional area through a given distance and allowing it to strike a piece of metal of given hardness. The energy per unit area is equal to  $\frac{1}{2} MV^2/A$ .

Distribution of the energy of impact over the anvil as affected by the area of the impactor is shown in Fig. 1. If we observe the results of this test, we find the depth of penetration of the impactor on the anvil would be increased as the cross sectional area of the impactor is decreased. From these relationships it can easily be seen that as the cutting edge of a tool begins to spall or in other words increase its frontal area, the BTU's per cu. in. will increase accordingly, and as a result



**LENOX**

## POWER HACK SAW BLADES are best by every test!

**QUALITY . . .** The very finest in both  
steels and workmanship

**SERVICE . . .** Prompt Deliveries

**TECHNICAL ASSISTANCE . . .**  
Whenever needed on unusual  
or difficult cutting problems

These things we pledge to you. The final test is on  
your own machines. Try Lenox for yourself . . . on  
any job . . . against any other blade in the world.  
Then you be the judge.



**LENOX**

**AMERICAN SAW  
& MFG. COMPANY**  
Springfield, Massachusetts

HACK SAWS BAND SAWS GROUND FLAT STOCK

the rate of tool failure will become greater.

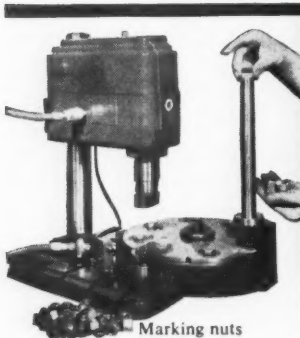
The presence of what is known as the "built-up edge" has the effect of increasing the area of contact and of keeping the BTU's per cu. in. at a much higher level than otherwise would prevail. This fact has been observed by Professor K. J. Trigger, of the University of Illinois, in his investigation of tool-work interface temperatures in metal cutting operations. This built-

up edge is that portion of metal wherein a sufficiently large number of atoms have been allowed to take place in the deformation process so as to raise the temperature of the matrix to the plastic state, and is observed as "build-up" on the cutting edge of the tool, sometimes becoming welded to the edge. Elimination of this built-up edge can be accomplished through either the application of decreased time or the use of chemicals which limit the number of

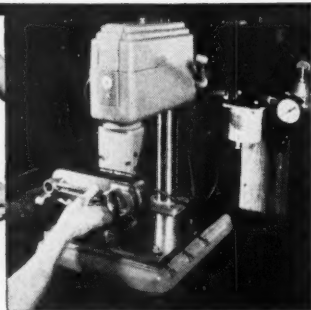
atoms allowed to take place in the deformation process.

#### Effect of Tool Shape

The effect of the shape of the cutting tool on tool life is of extreme importance. However, the use of critical clearance, rake and relief angles becomes less important if the basic reasons for tool failure are understood. Let us consider, for instance, the design of a single-point high-speed-steel tool. One of the first rules observed by the tool designer is to provide as much support to the cutting edge as possible. This is sometimes carried to such an



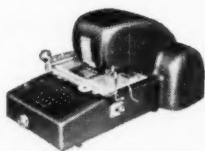
Marking nuts



Marking connecting rods and caps

## Mark More Parts per Minute

Whether your problem is the marking of nuts, bolts, connecting rods, axles, pots and pans or the branding of screw drivers, pencils, baseballs or ammunition belts—it will pay you to investigate the Automark. This automatic high-speed pneumatic marking machine needs no special jigs or fixtures for average work. Where holding devices are required several standard automatic fixtures are available. We'll gladly design and build special equipment. Write for Bulletin 712.



NEW Electric Typewriter marks metal name plates in one-fifth the time.

## AUTOMARK

### Automatic Marking MACHINE

Manufactured Exclusively By

**DEFIANCE MACHINE & TOOL COMPANY**

1924 South Vandeventer Ave. • St. Louis 10, Mo.

### AGENTS

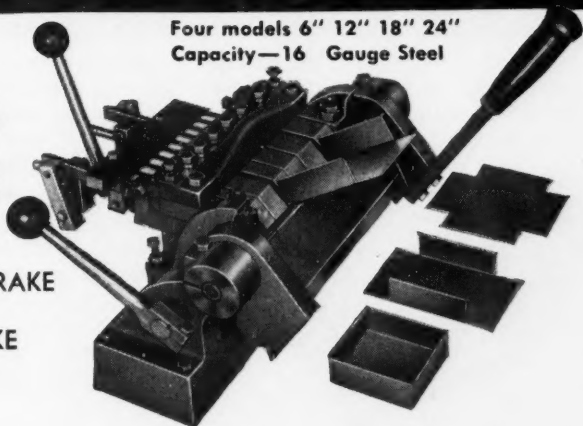
Desirable territories open for responsible representatives. Write for complete information, lines carried and territory covered.

# New! di-acro BOX FINGER BRAKE

Four models 6" 12" 18" 24"  
Capacity—16 Gauge Steel

## 3 TOOLS IN ONE

- 1 BOX and PAN BRAKE
- 2 STANDARD BRAKE
- 3 BAR FOLDER



**Versatility from the word GO!!** One box or 10,000—can be economically produced with the new Di-Acro Box Finger Brake. The complete box finger bar also serves perfectly for all standard brake operations. An Acute Angle Bar—quickly mounted—converts the brake to a bar folder for locks, seams, hems and sharp angles. The unique Di-Acro Open End Finger forms square or triangular tubes and other similar parts difficult to make.

Real machine tool construction, with hardened and precision ground box fingers, assures permanent accuracy in producing duplicated parts. The Box Finger Bar can be easily mounted on all standard Di-Acro Brakes.



### OPEN END FINGER

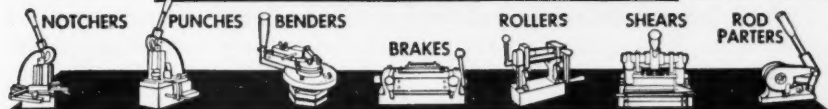
for forming triangular, square and rectangular tubes.

### Send for 40 PAGE CATALOG

describing DI-ACRO Shears, Punches, Benders, Brakes, Notchers and Rod Parters—also Power Shears and Benders.



## O'NEIL-IRWIN



306 8th Ave.  
Lake City, Minn.

extreme as to provide a wear land at the cutting edge of as much as 0.015 to 0.030 inch. In any event, the front relief is held to an absolute minimum, in order to obtain maximum support under the cutting edge.

Let us analyze the effect of this type of tool design on tool life. If we were to place the cutting edge of the cutting tool in the cone of a flame, which was

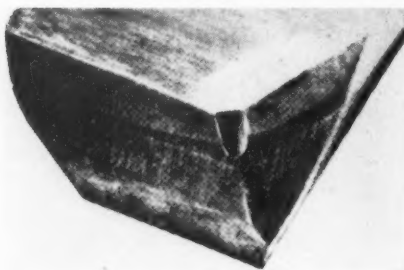


Fig. 2—Carbide tool erosion caused by rubbing against work.

yielding a given number of BTU's per min., we would find that the time required to anneal the cutting edge would depend upon the cubical contents of the metal adjacent to the edge. Therefore, it can be seen that as we back up the cutting edge with what is called "support," we actually increase the cubical contents of metal to be heated and consequently lengthen to a certain extent the amount of time necessary to produce the anneal. This condition does not hold, however, when the tool is used under actual cutting conditions. In actual cutting, the support, which has been built under the cutting edge, actually has the effect of increasing the area of contact, thus not only reducing the energy per unit area delivered to the metal, but also introducing a second factor wherein the BTU's per min. are multiplied many times. This factor

is one of simple wear or rubbing between the flat nose of the tool and the workpiece. Extensive erosion of a tungsten carbide tool, caused by rubbing against the work is shown in the illustration Figure 2.

In order for the tool to begin cutting at all, a back pressure of the tool against the work, sufficient to exceed the elastic limit of the metal, must be applied. In the case of the tool with the support under the cutting edge, the initial pressure is considerably higher than it would be if the cutting edge were completely relieved. It is desirable to provide as large a cubical content of metal around the cutting edge as possible; however, if this amount of metal is allowed to exceed a certain maximum amount, tool failure will be accelerated by reason of the rubbing action against the edge. In this connection, let us return to the consideration of high-speed milling, where we previously stated that it has been found that the design of the tool is extremely important in accomplishing good results. In this operation, negative-rake tools have been found to give far superior performance to positive-rake tools. In the use of a negative-rake tool, only the line portion of the cutting edge is in contact with the work, there being no flat area to exert a rubbing action against the work. At the same time, a maximum cubical content of metal is available around the cutting edge to prolong the time required for annealing.

When a cylindrical surface is in contact with a flat surface and where either one of the two elements is in motion, the quantity of heat produced at the interface, as a result of the rubbing action, is proportional to the speed and also the pressure. In the case of

**INDUSTRY'S  
LEADERS —  
SAY**

**Sentry**

**IN  
HEAT TREATING  
HIGH SPEED  
STEEL**



*Sentry Models 2Y at Charles L. Jarvis Co.,  
North Attleboro, Mass., plant.*

**Jarvis**

**"GETS MORE PRODUCTION ... UNIFORM HEAT!"**

"We must have constantly uniform heat in our hardening processes, and Sentry Furnaces with the Sentry Diamond Block hardening method gives us the desired results.

Each operator handles over 5,000 tap blanks per 9 hours in our Sentry furnaces at North Attleboro, a production rate we consider extremely high."

**REQUEST  
CATALOG**

**J-2**

**"ALWAYS**

**ON DUTY"**



**SENTRY MODEL YP**  
Vertical model  
for long, slender  
drills, reamers,  
broaches, etc.



**SENTRY MODEL 2Y**  
For small tools,  
cutters of moly,  
tungsten and co-  
balt high speed  
steels.



**THE SENTRY COMPANY**

**INDUSTRIAL ELECTRIC FURNACES AND EQUIPMENT FOR HEAT TREATMENT OF METALS**

high-speed milling, where the cutter speed is in excess of 500 sfpm., any tool which presents more than a line contact to the work surface will fail quite rapidly, due to the very high speeds employed. Therein lies the real reason for the superior performance of the negative-rake tool on this particular type of machining.

In this same type of machining, the

infed of the work to the cutter has been found to be of great importance in maintaining tool life. This can be explained by considering the relationship of the elastic limit to the cutting speed. If the speed of the milling cutter is increased to an excessive amount without increasing the infed of the work, the cutting edge would then be allowed to pass over the work surface

several times before it was able to move enough to exceed the elastic limit of the metal and acquire actual penetration. In this case, even with negative - rake tools, excessive rubbing action would occur and the tool failure would be rapidly accelerated. This same reasoning applies on all of the clearance angles on the tool, regardless of whether the tool is of high-speed or carbide variety.

In the design of any cutting tool, care should be exercised to make sure that no portion of the tool is permitted to present a rubbing surface against the work. In making this calculation

## SAVE 3 WAYS WITH



**1** SAVE with a Lucifer Electric Furnace on FIRST COST. Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces . . . feature by feature . . . you'll save money on the Lucifer Electric Furnace EVERY TIME.

**2** SAVE ON MAN HOURS with a Lucifer Electric Furnace. Less operator attention needed because Lucifer controls are EX-ACT. They reach SPECIFIED heat rapidly and retain SPECIFIED temperature without variation. No special experience required when you use a Lucifer.

**3** SAVE on maintenance expense with a Lucifer Electric Furnace. Finest refractory materials are built into Lucifer Furnaces for better, more efficient heat retention. Elements are guaranteed . . . long lived . . . trouble free. You save three ways with a Lucifer Electric Furnace, whether used for production or laboratory purpose. More than two thousand satisfied users.

### CHECK THESE PRICES

Furnace Size	2000'	2300'
6x 6x12"	\$467.00	\$548.00
9x 9x18"	647.50	764.00
12x12x24"	912.00	1068.90
18x18x36"	1419.75	1629.50

Complete with 100% automatic electronic controls.

WRITE for FREE literature, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering service and advice without obligation.

Write, wire or telephone TODAY.

## GILBERT S. SIMONSKI COMPANY

Route No. 611 Neshaminy 10, Pa. Phone Hatboro 0411  
Sole Manufacturers of Lucifer Electric Furnaces

# *Specify* **POPE**

**2500 SERIES—HEAVY DUTY MOTORIZED SPINDLES**

**for YOUR**

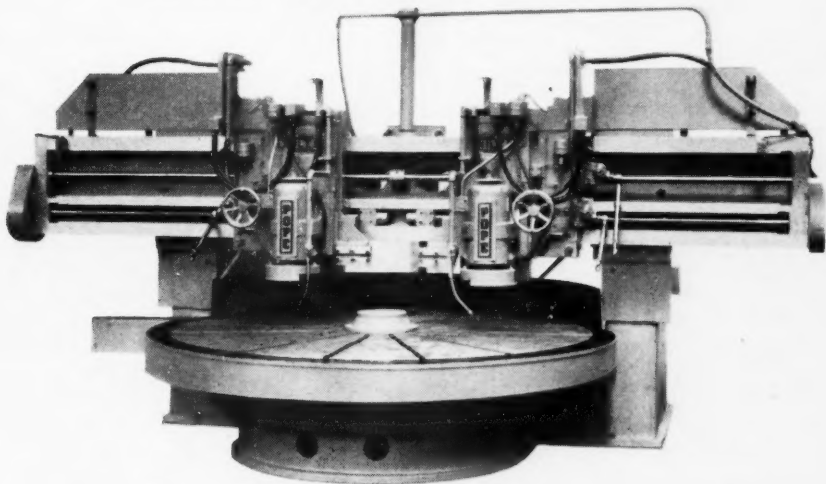
**BORING MILLS  
PLANERS**

**SURFACE  
GRINDERS**

**AND OTHER  
MACHINE TOOLS**

## **NILES TOOL WORKS BALDWIN—LIMA—HAMILTON CORP.**

SELECTED POPE 2500 SERIES SPINDLES for several of their high production machines such as the 120" Niles Boring Mill Type Grinder shown below.



For continuous production of accurate parts and for trouble-free operation, install

**POPE PRECISION SPINDLES**

No. 86

# **POPE**

**POPE MACHINERY CORPORATION**

ESTABLISHED 1930

261 RIVER STREET • HAVERHILL, MASSACHUSETTS  
BUILDERS OF PRECISION SPINDLES

the elastic limit of the metal must be taken into consideration.

The rubbing effect has been particularly noticeable in the testing of drills wherein the point angle of the drill was reduced from 118 to 100 degrees, thereby providing a much more acute angle of penetration. Drills used in this test were standard 18-4-1 high-speed-steel drills, drilling in cast iron. This particular change in drill design ac-

the chip decreases as the speed of the cut increases. This is further evidence of the fact that the metal increases its tendency to become brittle as the velocity of the deformation increases. This fact will tend to reduce the rubbing action against the tool.

#### Mechanism of Failure In Tool Materials

The mechanism of failure of high-speed steel and carbides is of the same

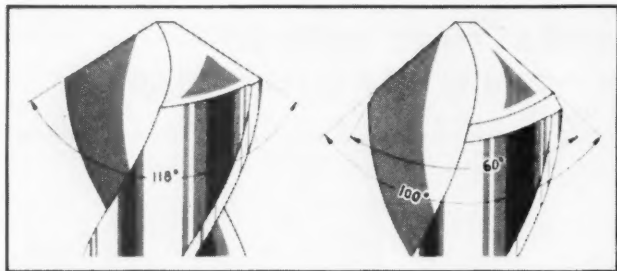


Fig. 3 — Change in drill grind (righthand view) which increased tool life 300 per cent.

counted for an overall life increase of about 300 per cent. The drill design used in the cast iron drilling test is shown in Fig. 3.

The use of negative-rake angles on cutting tools naturally increases the horsepower demand on the machine; however, when the machine capacity is sufficiently high to permit their use, a worthwhile increase in tool life and operating efficiency can be obtained.

In designing tools to machine metals which possess the ability to compress to a great extent without acquiring a permanent set, it is important to keep the chip load very high. This is particularly true in the design of broaches, where excessive rubbing can occur on the trailing surface of the cutting edge unless the tooth load is high enough to stay well beyond the compressibility limit of the metal. Chip thickness studies have shown that the thickness of

general character, i.e., they both fail due to an increase in internal energy brought about by the temperature to which they are exposed. In the case of high-speed steel, the increase in internal energy causes the breaking up of the crystals and ultimate loss of any definite shape. This is preceded by a gradual decrease in the hardness of the steel as the overall temperature of the matrix is increased. Although carbide tools do not show a material decrease in hardness as the internal energy is increased, they will begin to erode when the temperature reaches a point sufficient to cause plasticity of the cobalt binder. Because of their ability to maintain their hardness until failure occurs, they are capable of operating at much higher velocities than high-speed steel. As a result, the overall efficiency of the cutting operation is higher, because the machinability of

# A GOOD SPINDLE

FOR GOOD BORING AND TAPPING . . .

Here's a 10" tapping job  
on a 5-foot "AMERICAN"  
Hole Wizard Radial

It takes a sturdy, rigid machine with plenty of power to do work like this. Especially does it require a rigid and smooth-acting spindle.

And that's exactly what "AMERICAN" Hole Wizards are noted for. Power—rigidity—convenience and ease of control are "AMERICAN" attributes that cut drilling, tapping and boring costs wherever they are put on the job.

Bulletin No. 327 tells all about them. Want one?

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio U.S.A.

the metal increases as the velocity goes up. This is reflected in a much better surface finish, which is common with the use of carbide tools.

Carbide tools are generally considered to be very susceptible to impact failures and cracking caused by quenching. It is true that carbide tools are much more highly stressed than high-speed-steel tools, however their physical properties indicate tremendous strength, as for example, their

modulus of elasticity is higher than any other known material and has been measured to be approximately 79,000,000 psi. The torsional modulus of elasticity on a 13 per cent cobalt sample of carbide was measured at 17,250,000 psi, with high-speed steel under the same test showing 8,150,000 psi. The modulus of rupture of very hard cemented carbides has been determined to be 400,000 psi for a 13 per cent binder as compared with an equivalent figure

for high-speed steel under a similar test. This would indicate that any tendency of the carbide to high susceptibility to shock loads might be chargeable to something other than shock. At this point it is necessary to cover methods of handling high-speed-steel and carbide tools in preparing them for use on the machine.

#### Effect Of Tool Preparation On Tool Life

With present-day shop practice more than 50 per cent of the effective life of the tool is destroyed in the grinding process. This applies to dies, punches, rolls



*Speed up Production!*

#### Feed Parts

- Single File
- In Oriented Position
- Automatically
- At Controlled Rates



## SYNTRON

## PARTS FEEDERS

INCREASE CAPACITY of grinders and presses, inspection and packaging devices, and other automatic processing equipment. Feed without damage, parts of most sizes, shapes and materials at reduced costs. WRITE today for Free Catalog Folder, or send details of your problem along with sample parts for testing to . . .

### SYNTRON CO.

309 Lexington Ave.

Homer City, Pa.

MINOR in size yet a MAJOR new addition to



STANDARD

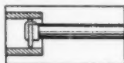
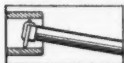
DIAL BORE GAGES

YES, Standard Gage, pioneer of dial bore gages, has developed a still newer type of dial gage for quick, accurate inspection of small diameter bores from .250" to .375". The ultimate in precision gaging of small bores, STANDARD'S No. 00 is based on an entirely new "interchangeable disc" principle, surprisingly simple in design, easy to set and easy to use.

- Readily entered in bore
- Holds its setting
- Gives positive repeat readings
- High visibility dial graduations of .0001" are easy to read

Sapphire tipped gaging plunger and chrome-plated centering-size discs insure a long, trouble-free gaging life.

### EASE OF OPERATION



Gage is entered at an angle to allow extended plunger to clear the bore, then rocked to cause plunger to pass a square position while noting minimum reading on the indicator.

When ordering be sure to state nominal size of bore and tolerance desired

**NEW #00 uses centering-size discs for checking bores from 1/4" to 3/8"**

- ★ Designed for tolerances up to .005"
- ★ Sapphire tipped gaging plunger
- ★ Chrome plated centering-size discs assure long "precision-service"



Enlarged diagram shows easy assembly of centering size disc on plunger.

New centering-size disc

Patent Applied For

A turn of the knurled clamping nut releases centering-size disc or locks it firmly in place.

### EASY "SIZE CONVERSION"

Conversion to various sizes in the range from .250" to .375" is accomplished by the quick interchange of centering-size discs on the same head by the one-step operation of turning a clamping nut. Positive locking action of this nut insures holding set dimension. Centering-size discs are furnished to suit dimensions of bore to be checked. No. 00 will check to within 1/4" of the bottom of a blind hole.

**Now** 8 sizes cover range of 1/4" to 16" in STANDARD'S line of Dial Bore Gages.  
Write for new complete Catalog C showing these and other gages.

**STANDARD GAGE CO., INC., Poughkeepsie, N.Y.**

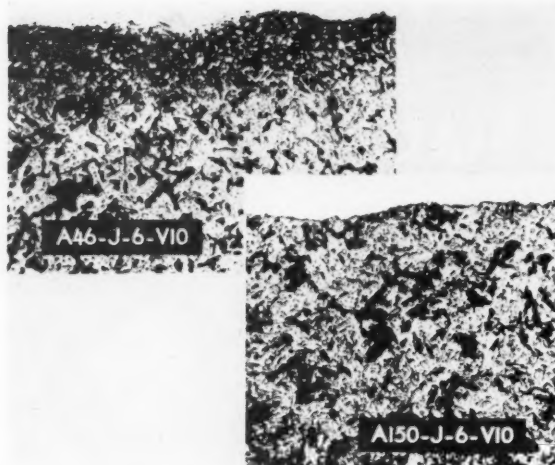


Fig. 4 — Effect of grinding SAE-52100 steel with 46-grain wheel (above), and 150-grain wheel (below).

and all other types of frictional tools. This not only applies to high-speed-steel but also to carbide tools and to every type of tool, although some types are more susceptible to this destructive action than others.

#### High-Speed-Steel Tools

When a high-speed-steel tool, for example, is taken from heat treat it will show a Rockwell hardness of 64 to 66 C. The tool blank is supplied to the tool grinding department where it is rough and finish ground to conform to the blueprint. Without exception when this tool is finished and ready to go to the machine, its Rockwell hardness is on the average, below 50. This fact is not generally recognized by either the tool engineer or the tool grinding department. The depth of the annealed layer will range from 0.002 to 0.003 in. to as much as  $\frac{1}{16}$  in., depending upon the severity of the grinding operation.

This situation will exist regardless of whether or not the tool is lapped, liquid honed or finished by any other

process after grinding. Many exterior treatments for restoring or otherwise increasing the wear characteristics of a cutting tool have been introduced. These range from nitriding to hard chrome plating and a variety of others. None of these treatments can equal the true wear characteristics or resist-

ance to deformation which was possessed by the virgin high-speed steel before it was touched with an abrasive wheel. Although one grinding wheel may show less tendency to burn than another, there is no such thing as a non-burning, cool grinding wheel if the grain size is larger than 150.

The upper left view of Fig. 4 shows the effect of grinding SAE-52100 steel with a coarse-grain (46 grain) wheel. In this test the hardness of the steel was Rockwell 64C. The depth of cut was 0.001 inch. A water soluble fluid was used. It can be seen that even under light cuts, severe damage was done to the steel. Figure 5 shows the net horsepower per cu. in. per min. and the wheel wear as a function of grain size and bond hardness. This chart shows that the hp/cu. in./min. of the 46-J wheel is practically double that of the 150-J or 150-M, while at the same time, the 46-J shows (Fig. 4) double the wear and maximum metallurgical disturbance.

The application of water soluble



## Obsolescence Keeps These Fellows On Your Payroll

New, Modern, RACINE Metal Cutting Machines step up your entire production. They save material — reduce cut-off time and lessen subsequent machining operation because they are so extremely accurate.

Savings in your metal cutting will help offset ever-mounting tax, labor and material cost. Late model RACINE Power Saws hit costs at the first stage in every metal working job — where the bar or billet is cut to size. All capacities — 6" x 6" to 20" x 20". Single purpose or fully automatic bar feed units.



Don't wait — let us send a competent field man now. He will review your work and recommend cost-cutting plans. Write RACINE HYDRAULIC MACHINERY, Inc., 2070 Albert, Racine, Wis.



# RACINE

**STANDARD  
FOR QUALITY  
AND PRECISION**

compounds, used with the expectation that they will keep the work cool and prevent burning by taking the heat away is of no use whatsoever in preventing this metallurgical disturbance. The length of this paper will not permit a detailed discussion of the physics

energy from the dull grains in the wheel to the workpiece. Efforts of this process are not only seen in the preservation of the hardness of the tool and an increase of 200 to 300 per cent in its useful life, but it will also be found that the amount of stock removed from the

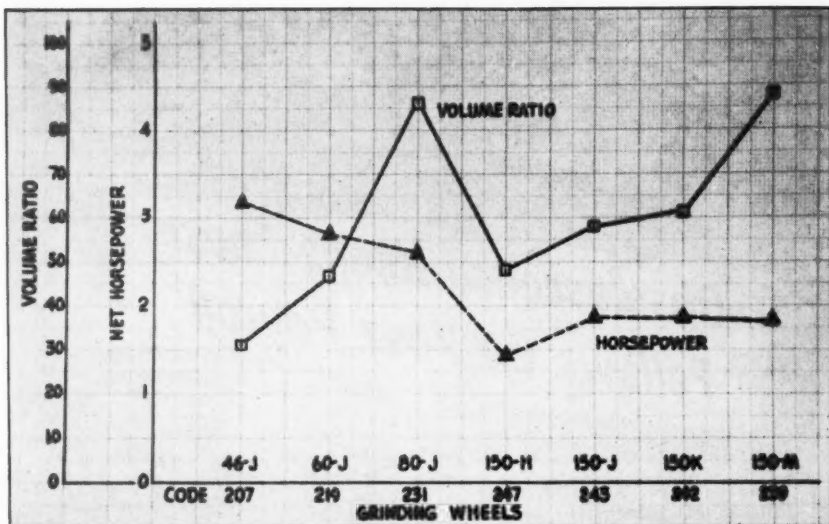


Fig. 5—Net horsepower and wheel wear as a function of grain size and bond hardness.

of the grinding process, however, we will take time to describe one method of tool grinding, which will prevent this undue metallurgical disturbance and will preserve the Rockwell hardness to approximately 60 to 62.

A very conclusive investigation of the grinding process has definitely proved that the grinding of high-speed-steel tools should be done with at least a 150-grain wheel with a bond hardness of H or I, preferably H in a vitrified bond. In addition to the fine-grain wheel, a straight grinding oil must be used or a true solution containing the ability to restrict the transference of

tool on each successive regrind will be considerably less than it is with conventional grinding methods.

In addition to this, both roughing and finishing can be done with one wheel, two separate operations being unnecessary. The overall grinding time per tool will be reduced by approximately 50 per cent. The lower right of Fig. 4 shows the result of using a 150-grain vitrified wheel under identical conditions with the 46-grain wheel. The photomicrograph shows clearly the lack of metallurgical disturbance when the fine-grain wheel was used. Unfortunately, very few tool room

**PERFECT  
MICRO FINISHES  
AT LOW COST**

**with  
SPECTRUM  
DIAMOND  
LAPPING  
COMPOUNDS**



TOLERANCES TO .000001"

To obtain bright mirror finishes on gauges, dies, molds, precision parts, cutting tools, etc. use Spectrum Diamond Lapping Compounds. They'll provide faster cutting, better finishes, uniform results at lowest cost.

Spectrum Diamond Lapping Compounds are being widely used in tool rooms, laboratories and in production finishing. Produced from pure virgin diamond, precision graded in strict accordance with U.S. Bureau of Standards specifications, these compounds are available in 12 grit sizes each with its own identifying color.

The twelve grit sizes of Spectrum Diamond Lapping Compounds are available in tubes, sticks and cartridges. Complete kits of Spectrum Compounds and accessories can be obtained for the tool room and laboratory.

Write for catalogs and additional information to Penn Scientific Products Company,  
5941 Alma Street, Philadelphia 24, Pa.

**SPECTRUM**

**DIAMOND LAPPING METHODS**

grinders are equipped for this type of operation. However, if management would consider the tremendous loss of tools occurring through conventional grinding practice, they would lose no time in making the necessary revisions.

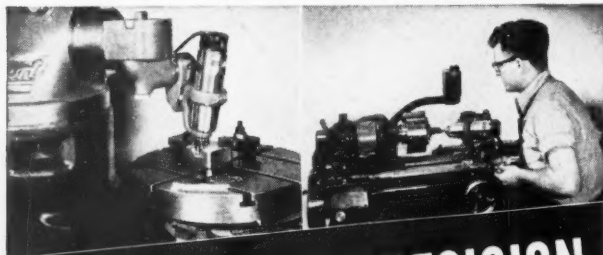
### Carbide Tools

In the grinding of carbide tools, the same general condition exists except that the finish grinding is usually done

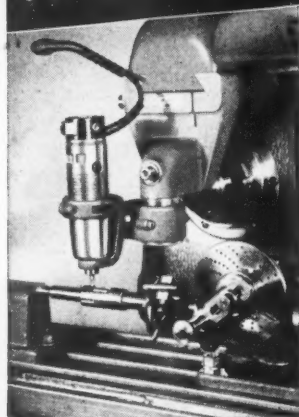
with diamond wheels. The average shop thinks nothing of taking a carbide tool, placing it on a dry grinder with a coarse-grain wheel ranging from 46 to 60 grain, and roughing in the chip breaker and the general form. They then place the tool on the diamond wheel and complete what they call the "finish grind."

In this case, the action of the coarse-grain wheel is not to soften the tool but to raise its internal energy so that

it is very highly susceptible to impact failure. If the tool is ground so that it is subjected to any kind of a rubbing action in the cutting process, its resistance to deformation under heat has been greatly reduced. If the average shop would examine the carbide tools which are placed on the machine after grinding, they would find that over 50 per cent of the tools have incipient cracks which have been caused by the grinding process. However, whether or not a crack exists by known methods of detection, damage has been done with this type of grinding. The tool



**LOWEST COST PRECISION  
FOR TOOL ROOM AND PRODUCTION**



**ONE PORTABLE MULTI-PURPOSE PRECISE GRINDER-MILLER WITH MACHINE TOOL MOUNT DOES THE WORK OF A SINGLE-PURPOSE MACHINE COSTING 100 TIMES AS MUCH!**

Little can be done today to reduce labor and material costs. For substantial savings employ new, better techniques. Mount PRECISE Grinder-Millers on lathes, drill presses, milling machines and other machine tools or use in special production set-ups.  $\frac{1}{4}$  HP; speeds from 20,000 to 8,000 r.p.m.; 115 volts, AC-DC. Ruggedly built for continuous duty. All metal housing; rigid PRECISE quill; sealed micro-precision bearings. *High speeds and accurate PRECISE quill and chuck are ideal for tungsten carbide cutters. PRECISE will grind, mill or finish any material from soft wood to the hardest alloy steel.*

*Write* **FOR CATALOG**

**PRECISE PRODUCTS CO., 1345 Clark St., Racine, Wis.**

**PRECISE GRINDER-MILLERS**



## Meet your B-RIGHT-ON dealer

Just as you must know your customers' needs . . . he knows yours. He really understands . . . as does every Brighton franchise holder . . . the uses and applications of socket screws . . . and is ready at any time to advise you.

One of his most important functions is to give you prompt service. He's johnny-on-the-spot . . . filling your order from his adequate stock, backed up by centrally located Brighton factory stocks.

He's proud of Brighton Screws . . . they're a real quality line . . . meeting all of your requirements, including the highest standards of strength, accuracy and uniformity.

Make your Brighton dealer a member of your production team . . . get his help on *any* socket screw question. If you're not already acquainted . . . write for his name.

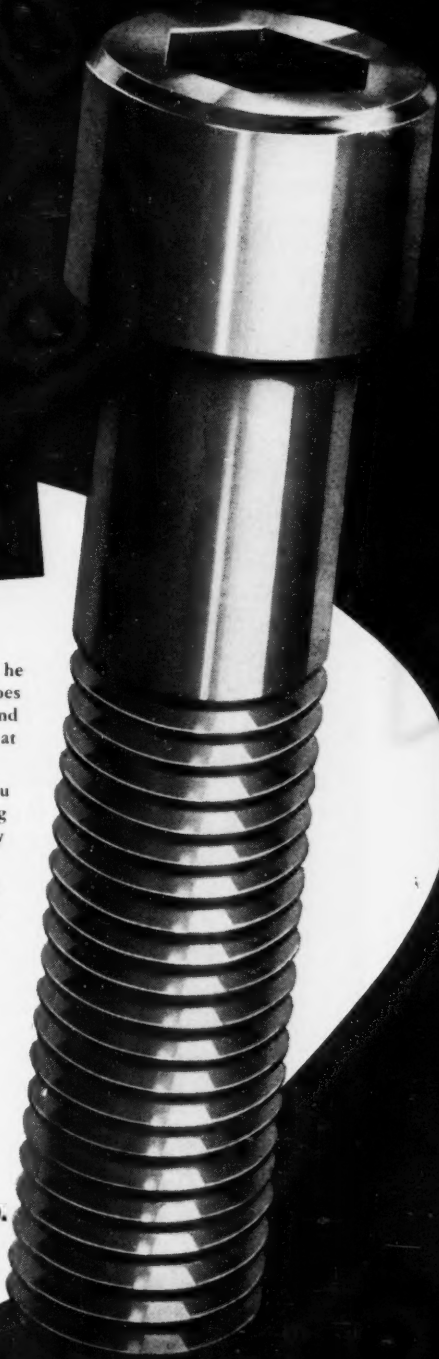
- Socket Set Screws
- Socket Cap Screws
- Socket Head Stripper Bolts
- Socket Pipe Plugs

**THE BRIGHTON SCREW & MANUFACTURING CO.**



Reading Road at Dorchester

Cincinnati 2, Ohio



may already be stressed in the grinding process to a point where the slightest impact blow will cause flaking and failure.

#### **Effect Of Cutting Fluids On Machinability and Tool Life**

It is commonly recognized that tremendous improvements in surface finish and tool life can be effected through

the use of carbon tetrachloride as a machining fluid. Many explanations have been given of the function of carbon tetrachloride, ranging from the creation of low-shear, low-friction films to super cooling due to its high volatility. If either of these explanations be examined from a truly scientific viewpoint, and in the light of what we know from actual practice, there will be found no basis for either one of them.

The formation of an iron chloride film, which undoubtedly does take place in the use of carbon tetrachloride, is a transient effect and cannot exist at the temperatures commonly encountered in cutting metal. It has been determined, however, through actual measurement of the tool-work interface temperatures by use of the tool-work thermocouple, that the tool tip temperatures when carbon tetrachloride is used are at least 25 per cent lower than in dry cutting. In these same tests the use of water soluble compounds as well as ordinary



## *Attention -* **MR. MACHINIST!**

**FOR THE TUFFEST LATHE  
CENTER AND STEADY  
REST LUBRICATION JOBS  
IN YOUR SHOP — USE**

## **MOLYKOTE - CENTERLUBE**

**No more burning and chewing up  
of dead centers • No more spoiled  
work from steady rest markings.**

*Keep A Handy Tube On Every  
Machine Tool*

*Send For Detailed Information*

**THE ALPHA CORPORATION**  
Greenwich, Conn.

# NEW

## boring tool set

FOR  
BORING  
MILLS  
TURRET  
LATHES  
MILLING  
MACHINES

by **PORTAGE**  
*Quick Change*

**P. D. Q.**  
(Portage Double Quick)



Featuring the new...  
... **TRIPLE lock grip**

### *Portage Holders*

No. 4, 5, 6, Morse  
Tapers  
No. 40 & 50 Milling  
Machine Tapers  
Holders designed to  
fit any application.

PORTAGE opens a new era in Quick Change Tools. Tapered contact with the new **TRIPLE LOCK**, assures faster tool change, positive repositioning, greater rigidity and longer wear life. A really **COMPLETE** set for **BORING, MILLING** and **TURRET LATHE** use. Also supplied (if desired) is a wooden rack especially designed for the set.

*If you have not seen this... proved on  
the job set... write for details NOW.*

**PORTAGE DOUBLE QUICK TOOL CO.**

1041 Sweitzer Avenue

Akron 11, Ohio

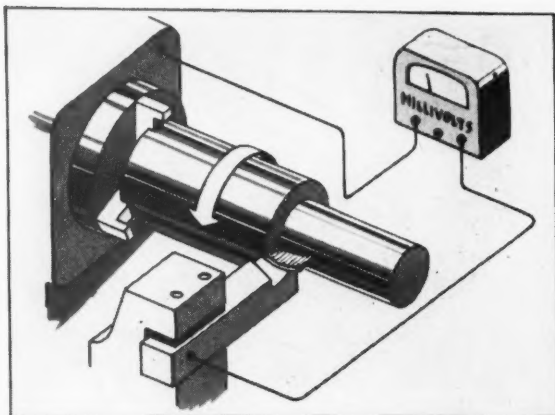


Fig. 6—Thermocouple, formed by work-tool contact, generates voltage proportional to contact temperature between the tool and work.

cutting oils showed little or no decrease in tool tip temperatures.

A reasonable explanation of the function of carbon tetrachloride would be as follows. It is known that carbon tetrachloride disassociates into its respective elements of carbon and chlorine at approximately 550 deg. F. At the instant of disassociation, both of the elements are in the atomic state. If we consider the fact that carbon tetrachloride would be disassociated into its atomic components at the tool tip, we have all the necessary conditions to bring about the penetration of the voids by the atomic chlorine and the atomic carbon. As this process takes place, the internal energy of the lattice is raised sufficiently to cause it to respond to much lower rupture forces and, due to the packing of the lattice with foreign atoms, the atomic movement is restricted. The result is an embrittling tendency of that portion of the metal immediately adjacent to the rupture area. The BTU's per cubic inch of metal cut would thus be decreased because of the increased internal energy by the infiltration of the foreign atom into the lattice, and by

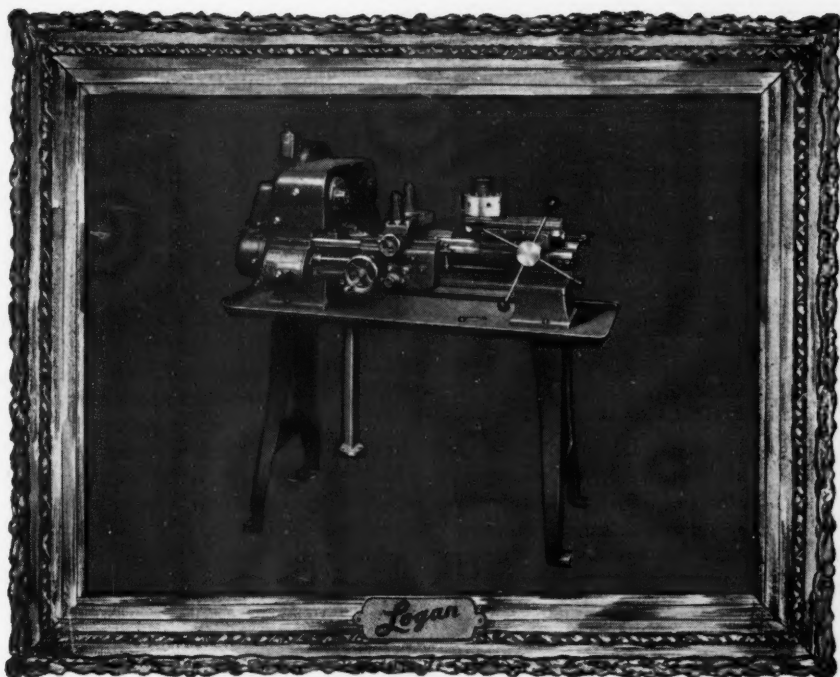
the fact that a fewer number of atoms are allowed to take place in the deformation process. Therefore, the function of carbon tetrachloride actually changes the machinability rating of the steel, which is in turn reflected in increased tool life because of the decreased number of BTU's per cu. in. of metal cut.

If we recognize this as the mechanism of the function of cutting fluids, we should also find the same effect evidenced by the use of other types of chemicals, which are capable of producing the same result. If we were to investigate the effect of certain gases we would find a similar pattern of performance.

#### Carbon Dioxide

There has already been considerable work done in the use of carbon dioxide as an aid in metal cutting. In this case the mechanism is similar to that of carbon tetrachloride, except that carbon dioxide disassociates into carbon and oxygen which are in the atomic state at the instant of decomposition and are capable of penetration of the lattice exactly the same as the chlorine and carbon. As a result, the internal energy of the lattice is increased as was the case with carbon tetrachloride.

Unfortunately the toxicity of carbon tetrachloride prohibits its use in



## PRODUCTION MASTERPIECE

# THE *Logan* LATHE

**Puts Profit In Production**

Logan 940-2  
Quick Change Gear  
Turret Lathe  
11" Swing, 1" Collet Capacity,  
1 3/8" Spindle Hole

Industry's respect for the Logan Lathe as a metal-working production tool is not an overnight development. Through the years, Logan Lathes have put many a production line on a profitable basis. Today, with its 11" swing, 1" collet capacity, and 1 3/8" spindle hole, the production efficiency of the Logan Lathe is being used on a wider scale than ever before.

The Logan is easily set up for every type of lathe turning operation. The Logan ball bearing mounted spindle has the sustained accuracy at high speeds to

hold precision tolerances. The lasting accuracy and rugged durability of Logan construction keep production going at top efficiency, at minimum cost per finished part. For the production line, tool room or machine shop, no other lathe of comparable specifications can match the Logan in economy.

WRITE FOR THIS  
LOGAN LATHE AND  
SHAPER CATALOG



LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

**LOGAN ENGINEERING CO.**

4901 West Lawrence Avenue, Chicago 30, Illinois

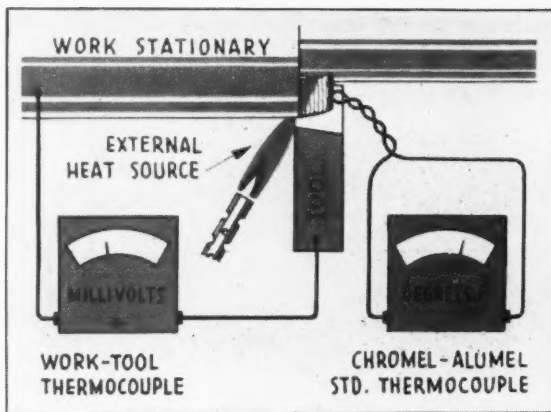


Fig. 7—Calibration is accomplished by stalling tool in cut to maintain contact, soldering in a standard thermocouple, and applying heat.

the shop unless special precautions are taken to properly remove the vapors. In addition to the toxicity hazard, carbon tetrachloride will greatly accelerate corrosion on metals of various types.

#### Sulphurized and Chlorated Oils

In order for any cutting fluid to actually aid in improving tool life, it must be capable of yielding atomic elements, which are in turn capable of stressing the atomic lattice or otherwise raising its internal energy. The use of ordinary sulphurized or chlorated oils is of little help unless they are capable of disassociation into the atomic state. The cooling effect of a cutting fluid can be completely neglected, since it has absolutely no bearing on the life of the cutting tool or the machinability of the steel. When fluids of this type are used, the volumetric quantity is of no importance in the performance of the fluid, it being only necessary to coat the tool-work interface during the rupturing operation.

Because of product design and machine tool limitations, the use of rela-

tively high-viscosity carrying agents will sometimes be found highly beneficial in improving tool life. Low-viscosity materials tend to run off the tool or the work and thereby allow the cut to proceed while it is insufficiently

supplied with the active materials. The effect of lard oil, with which most every shop is familiar, can be ascribed primarily to its ability to yield atomic carbon upon decomposition. Conclusive tests have proved that active ingredients of the proper character, made into a very viscous base and painted on the cutting tool or the work with a paint brush, will outperform the best cutting fluids now available. The improvement in tool life between the use of a fluid of this type and ordinary cutting oils or water soluble compounds is of the order of 400 to 800 per cent. These results apply regardless of whether or not the tools are high-speed steel or carbide.

#### Work-Tool Thermocouple Tests For Machinability

If we summarize the factors and relationships previously described in this paper, we find that the common variable from one metal or alloy to another which represents its machinability is its **free energy**, and its manifestation is the number of BTU's generated per cu. in. of metal cut under any given set of cutting conditions. This

understanding explains why it is possible to have one heat of steel which may meet the exact physical and chemical specifications of a previous heat yet be relatively non-machinable compared to the previous heat. It also explains why certain other types of heat treatment decrease the machinability. Isolation of this factor as a common denominator of machinability suggests a method of rapidly determining the relative machinability of one metal or alloy to another. Utilization of the work-tool thermocouple can be made to conduct these determinations.

Figure 6 shows a schematic layout of the tool-work thermocouple. In setting up this equipment, a lathe having a d.c. variable-speed drive should be used. In this case the tool tip temperature is recorded on a recording millivolt meter and these readings are in turn converted to actual temperature and BTU's per cu. (Fig. 7 and 8).

By this method the most efficient feed and speed may be determined by running a series of investigations where either the speed or the feed is varied. The metal or alloy showing the highest millivolt or temperature reading for any given set of machining conditions would have the lowest machinability rating, and the machinability index would improve as the millivolt or temperature readings decreased. By this same method cutting fluids can be evaluated, their effectiveness being indicated by the reduced millivolt or temperature reading as a result of their use.

Professor K. J. Trigger, of the University of Illinois, has for the last several years conducted investigations on tool-work interface temperatures by utilizing this method. His several pa-

## **BRADFORD METALMASTER LATHES**

### **Geared Head Engine and Tool Room Lathes**

**14 1/2" - 16 1/2" - 18 1/2" actual  
swing**

The Bradford *Metalmaster* Lathe is known throughout industry for its high efficiency, speed, dependable accuracy and durability under heavy service. A sound design, precision workmanship and the use of the finest materials and components have made the *Metalmaster* the top performing lathe of its class.

## **BRADFORD**

### **"METALMASTER" GRINDERS**

Are better built; will give years of outstanding performance on the most rugged kinds of external grinding and tool sharpening work.



#### **Heavy Duty Model 200**

Motor totally enclosed. All ball bearing construction. Meets American Safety Code standards. Exhaust connections, spark breakers, eye shields, positive shaft lock. 220-440 - 550 volts, 50 or 60 cycles, 2 or 3 phase motors with 2 to 7 1/2 h.p. capacities.

Get the tools that do the job—faster—better—at less cost. Specify Bradford Tools. See your Bradford dealer or write for complete information.

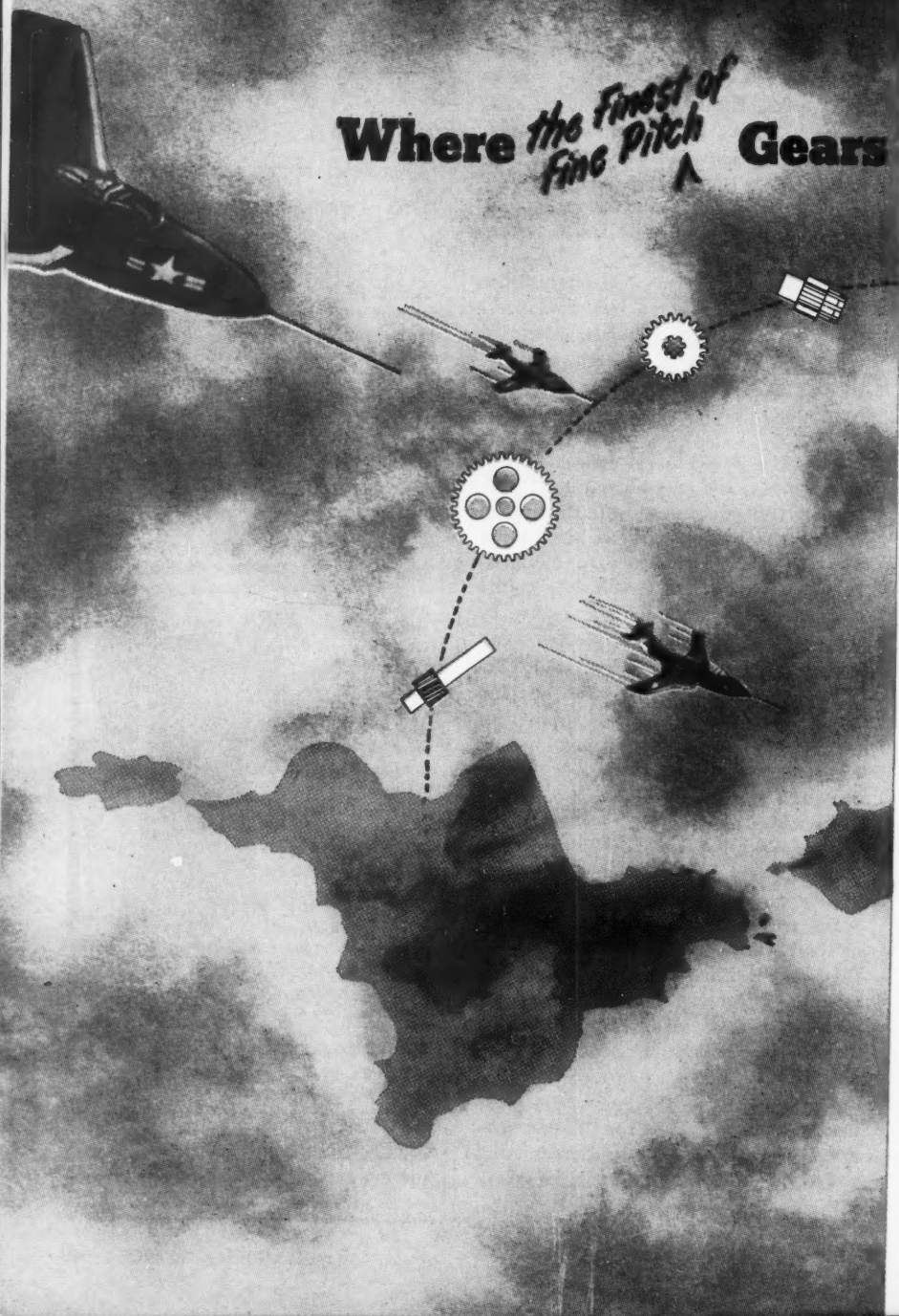
### **The BRADFORD MACHINE TOOL Co.**

658 Evans St.

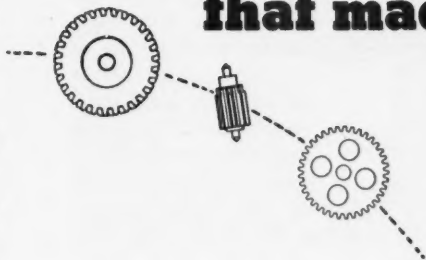
Cincinnati, Ohio

*Precision since 1840*

**Where the Finest of  
Fine Pitch <sup>^</sup> Gears**



# justify the Machine-Skill that made them



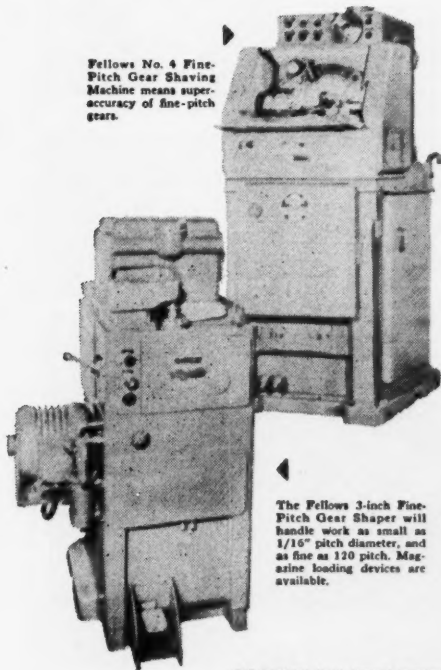
Gear trains designed to perform super-precision control functions in the stratosphere are no ordinary product. Neither are the methods and machines by which they are turned out—in quantity.

The Fellows 3-inch Gear Shapers and Fellows Shaving Machines, on which the great majority of such gears are made, are standard machines—maintained in fine adjustment by men of industry, men whose production-shop skill is unmatched anywhere else in the world.

That we have the tools, the talent, and the engineering imagination to make maximum use of them is America's fundamental strong defense.

If you have a fine-pitch gear production problem—to normal or extra-close limits—let a Fellows Sales Engineer give you a close-up look at the cost-cutting possibilities of Fellows 3-inch Gear Shaper and No. 4 Fine Pitch Gear Shaving Machine.

Fellows No. 4 Fine-Pitch Gear Shaving Machine means super-accuracy of fine-pitch gears.



The Fellows 3-inch Fine-Pitch Gear Shaper will handle work as small as 1/16" pitch diameter, and as fine as 120 pitch. Magazine loading devices are available.

# *Fellows*

THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont  
Branch Offices: 323 Fisher Bldg., Detroit 2 • 5835 West North Ave., Chicago 39 • 2206 Empire State Bldg., New York 1

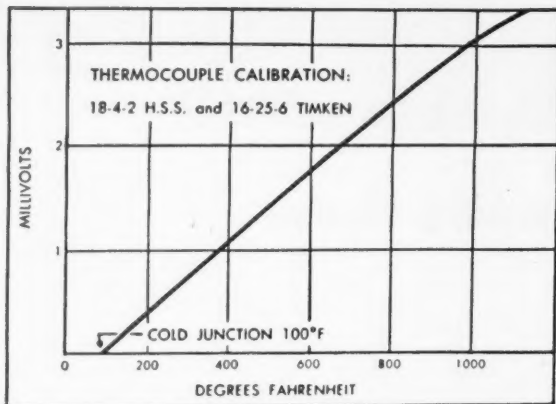


Fig. 8 — Plotting millivolts generated by the work-tool couple against known temperature gives the conversion curve for that combination.

Most of the work has been done on investigating the **results** of cutting metal rather than on the real **causes** of the results. It is, therefore, necessary to depend, to some extent, on theoretical reason-

pers, beginning in 1947, have been published and will be found in the transactions of the American Society of Mechanical Engineers. The work that Professor Trigger has done correlates very well with the explanation and relationships given in this paper.

#### Summary

Although a considerable amount of theoretical reasoning has been used in this paper, the conclusions agree very well with published data. Furthermore, it must be remembered that very little work has been done in investigating machinability and tool life as effected by changes occurring in the atomic lattice during the cutting operation.

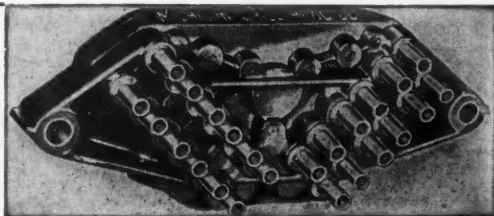
ing in order to reach a conclusion. However, the conclusion is in agreement with known facts and results.



Pictured: a 24-Spindle Heavy-Duty Drill Head.

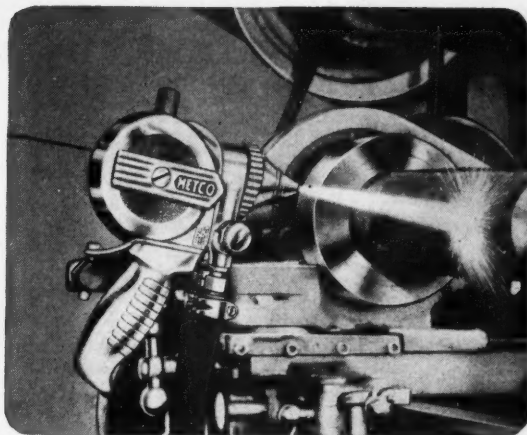
**DESIGNERS AND  
MANUFACTURERS  
OF MULTIPLE DRILL-  
ING EQUIPMENT.**

**We Invite Your Inquiry.**



**MICHIGAN DRILL HEAD CO.**

971 E. 8-Mile Road, Hazel Park, Mich.



**now  
a really  
low-cost  
metallizing  
installation...  
with the new  
Metco L-Gun**



Metallizing damaged journals on turbine shaft



Building up worn brake drum



Metallizing protective coating on steel plate

New, low, compressed-air requirements... only 10 cfm at 40 to 60 psi, already available in many shops, or supplied by inexpensive 3 hp compressor... bring metallizing within reach of the small user.

Here's a chance for the smaller maintenance shop to get into profitable metallizing operations like these:

- ▶ Save up to 90% of replacement costs on machine repair jobs,
- ▶ Do your own hard-facing,
- ▶ Apply long-wearing corrosion-resistant coatings to exterior plant structures, tanks and other equipment.

**Sprays 23 Different Metallizing Wires—**With the new L-Gun you can spray .10, .25, .80 carbon steels, stainless; babbitts, brass, bronze; nickel, aluminum, tin, zinc; special hard-facing materials such as Metco-Weld H. and the new self-bonding Sprabond wire.

**It's Versatile—**Use the L-Gun machine-mounted or hand-held—it weighs only 4 lb. 2 oz. Do all kinds of metallizing work—shaft and bore build-up with harder, longer wearing metals; build up worn pump plungers, crankshafts, motor shafts; apply corrosion-resistant coatings. There are hundreds of different jobs that are "naturals" for metallizing.\*

**Same High Quality as Other Metco Guns—**The low air requirements of the new L-Gun have been achieved without any

sacrifice in Metco quality. It embodies new developments in turbine and nozzle construction—is built, like all Metco guns, for rugged, dependable service.

**A Real Opportunity for the Smaller Shop—**Thousands of large, well-known companies have been metallizing users for many years, not only in maintenance but in production applications on original equipment. Now, with the development of the new L-Gun, and a low cost installation, metallizing is within the reach of even the smallest plant. (We'll be glad to send you the names of some Metco users—large and small.)

**Free Bulletin or Shop Demonstration—**Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.



The following names are the property of Metallizing Engineering Co., Inc.  
METCO • Sprabond wire • Metco-Weld

REG. U. S. PAT. OFF.

**METALLIZING ENGINEERING CO., INC.**  
38-17 30th STREET LONG ISLAND CITY 1, N. Y.

In Great Britain: METALLIZING EQUIPMENT COMPANY LTD., Tottenham, London, England

R. J. McWaters,  
Metallizing Engineering Co., Inc.  
38-17 30th St., Long Island City 1, New York

- ☐ Please send me more information about metallizing.
- ☐ Please arrange a demonstration in my shop.

Name

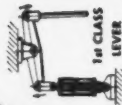
Company

Address

City  Zone  State

*...how can I use*  
**HANNA<sup>®</sup>**  
**cylinder power**

*in my  
machine tools  
and  
equipment?*



1st CLASS  
LEVER



2nd CLASS  
LEVER



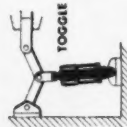
3rd CLASS LEVER



STRAIGHT  
LINE  
MOTION  
IN TWO  
DIRECTIONS



STRAIGHT LINE  
THRUST REDUCED



TOGGLE

STRAIGHT LINE  
MOTION MULTIPLIED 2:1



**IF YOU HAVE** a push, pull, lift, press, clamp or control problem, Hanna Cylinder Power can be the answer. The mechanical movements here illustrated may suggest ways Hanna Cylinders can be used to simplify the actuation and control of machines or equipment and to replace or reduce manual effort.

In the majority of cases, you can select a standard cylinder model to meet your specific requirements from the broad Hanna Hydraulic and Pneumatic lines. Regardless of whether you choose a "standard" or "special" the Hanna label assures you of quality developed through fifty years of concentration on cylinders and their control valves!



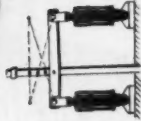
# Hanna Engineering Works

1758 ELSTON AVE. • CHICAGO 22, ILL.

*here are basic  
Cylinder Powered  
MECHANICAL MOVEMENTS  
that can be put to work  
for YOU!*



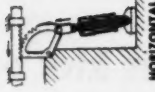
STRAIGHT PUSH



4 POSITIVE POSITIONS  
WITH TWO CYLINDERS



TRANSMISSION PLATE

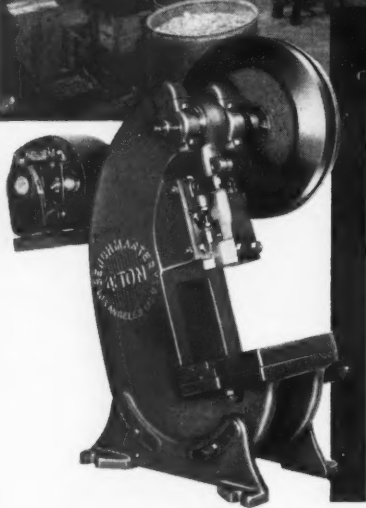
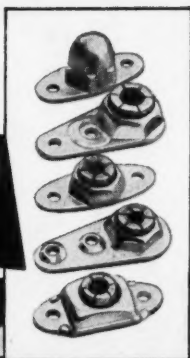


HORIZONTAL  
PARALLEL MOTION

HYDRAULIC AND PNEUMATIC EQUIPMENT... CYLINDERS... VALVES... RIVETERS

**14 Benchmasters kick out  
202,500 parts per day!**

***...paid for themselves in 30 days!***



Write today for complete information on how the Benchmaster line of 1, 4 and 7½ ton punch presses can help you produce more.

The Nutt-Shel Company, Glendale, California, manufactures an assortment of aluminum, steel and stainless steel self-locking anchor nuts and nut and bolt retainers for the aircraft industry.

Their five-day-weekly production is 1¼ million assemblies, 90% of which is produced on Benchmaster 4-ton punch presses... proving again that for high production and year-in, year-out dependability you can't beat a Benchmaster!

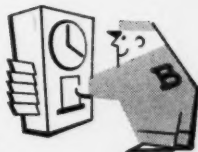
**benchmaster**

**MANUFACTURING COMPANY**

1835 W. Rosecrans Avenue, Gardena, Calif.

# SAVE MAN HOURS, WORK HANDLING

BY COMBINED OPERATIONS  
IN A SINGLE SET-UP!

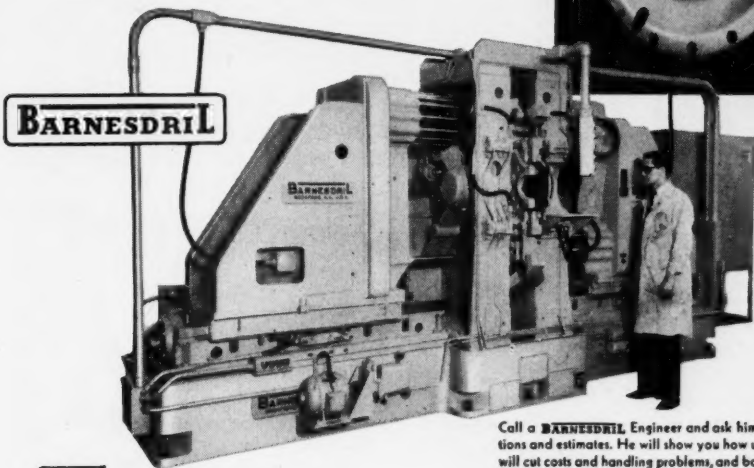
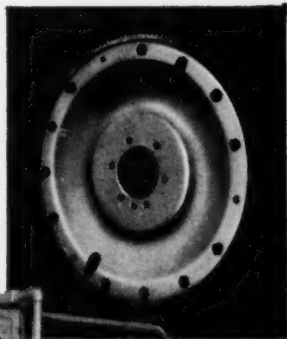


## ON BARNESDRIL UNIT-MACHINES

Choose the rate of output and sequence of operations for machining on one of your production parts. **BARNESDRIL** Engineers will arrange these operations into a single automatic cycle to give you the output you need at the lowest possible cost-per-piece.

Straight-line conveyor, transfer-type, or simultaneous multiple operations — machined on rotary index, drum or lateral index fixtures — will give you maximum efficiency, eliminating work transfer-time, and individual machine maintenance and downtime.

This **BARNESDRIL** 2-Way Horizontal Drum-Type Machine performs 40 operations per piece at the rate of 120 pieces per hour — drilling, chamfering, reaming.



Call a **BARNESDRIL** Engineer and ask him for specifications and estimates. He will show you how unit-machining will cut costs and handling problems, and boost efficiency.

Get This New  
Unit-Machining  
Bulletin

Complete description of Unit sizes and capacities, with work transfer set-ups. Write for Bulletin B-150.

## BARNES DRILL CO.

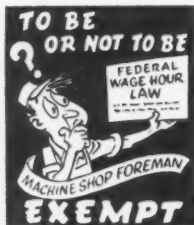
860 CHESTNUT STREET • ROCKFORD, ILLINOIS

# Interpreting Business Legislation

## The Federal Wage-Hour Law as it affects machine shop foremen.

By ROBLEY D. STEVENS  
Management Consultant

**W**HY is it that one foreman is exempted and another not? How can the foreman in a machine shop become exempted? The following article gives a quick



"How can the foreman in a machine shop become exempted?"

means of checking the formula at a glance. Does the job affect the foreman? Does the new Fair Labor Standards Amendments affect the foreman's overtime pay? When and how does a foreman go about claiming exemption? If he meets the requirements, what are the chances of receiving official approval? Are machine shops paying their foremen earned or unearned overtime pay? Will the Federal wage-hour investigator produce for your machine shop a bill for overtime pay for its foremen? Have you accurate and adequate records to support claims?

*Illustrated by Don Ritchie.*

These and other practical questions are raised daily by machine shops throughout the United States after the management has been hailed into the Wage-Hour & Public Contracts Divisions, U. S. Department of Labor for alleged violations on the status of their foremen.

Even more important is the revelation of this federal agency which reported in its Annual Report that,



"... questions are raised daily by machine shops throughout the United States ..."

among the short-comings of employers in the free enterprise system (including machine shops) who were investigated last year, were instances of

disregard of the overtime provisions, improper computation of the regular rate of pay, mis-application of the exemptions for the executive and administrative type of foreman, and inadvertent clerical errors. In trying to untangle some of these errors and misunderstandings, wage-hour inspections disclosed withheld underpayments totaling \$9,559,628 owed to 140,872 employees in 12,345 establishments. In addition, falsifications of records were disclosed in 445 establishments.

In the light of this, it would be worthwhile for machine shop management to review the key requirements for qualifying foremen. Otherwise, it may be adding a sizable sum to its overtime bill unnecessarily.

When this writer was a former law-enforcement agent for this federal agency, he checked several machine shops, and they were found in non-compliance and were sanctioned heavy penalties. Since the sums involved a substantial amount, these case histories might be of use as a guidepost for all machine shops to go by and use.

One of the main reasons why these machine shops were found in violation was due to "misclassification" of some of their foremen. In other words, if the machine shop management involved had utilized the official exemption chart and the foremen concerned had

met all of its requirements, a large slice of the overtime bill might have been eliminated. These wage-hour inspections proved costly, both in time and in money even though the



"Do your machine shop foremen know the rules and regulations?"

## About the Author



ROBLEY D. STEVENS

**R**OBLEY D. STEVENS, LL.B., J.D., LL.D., is a management consultant, specializing in labor relations in the realm of conducting independent surveys of employer's operations under the Fair Labor Standards Act; Walsh-Healey Public Contracts Act; Wage-Salary Stabilization; Collective Bargaining practices under the Taft-Hartley Act.

He received his LL.B., J.D., and LL.D. from the Blackstone College of Law, originally founded by William Sprague, organizer of the Commercial Law League.

He is the co-author, with Professor E. W. Mounce of "Collective Bargaining" text, available from the International Textbook Company; and "Regulatory Recordkeeping" available from the LaSalle Extension University, including numerous articles on industrial relations for national magazines.

errors were due to misunderstanding. Unfortunately, when I applied the official "tests" for exemption, a number of these machine shop foremen could be classified properly as regular workers for numerous reasons.

Do your machine shop foremen know the rules and regulations? Are they

taking full advantage of the exemption allowed them? Unless they do, by the time the wage-hour inspector finishes his investigation and uncovers violations, it is usually too late to do anything about the situation.

It's no secret that machine shop foremen and supervisors are exempted from overtime pay after 40 hours per week when they meet all the official tests prescribed. However, the newly amended regulations provide for "tests" of duties, responsibilities, salary levels, and other requirements which machine shop management should apply in determining which foremen are actually exempted from overtime pay.

This often entails a check with the federal formula and the machine shop records to be certain if the foremen are exempt. It would probably be a

costly mistake to hastily conclude that foremen in a machine shop are exempt because they are a part of supervisory management. Of course, the wage-hour inspector can be wrong only if the records actually reveal that machine shop foremen are qualified for exemption. However, to find the answers to this bothersome problem and stay within the requirements of the Federal Wage-Hour law, machine shop management should make sure that its answers are "yes" to the following stipulations.

#### **Machine Shop Exemption Provision For Foremen**

Section 13(a)(1) of the Fair Labor Standards Amendments of 1949 exempts from the wage and hour provisions, "any employee employed in a bona fide executive or administrative capacity." In other words, if a foreman

## **SAWMASTER HACK SAW**



LOW PRICED

**PORTABLE**  
SELF-CONTAINED

READY TO WORK

Angle  
Cutting  
Vise

**STURDY**  
ECONOMICAL

Write for Bulletin  
No. 300

## **MILLER-KNUTH MFG. CO. OMAHA, NEB.**

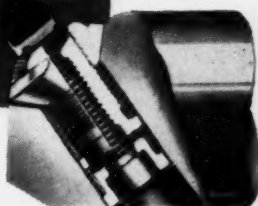
# MICROBORE

4 DEVICES

## Special Boring Bars

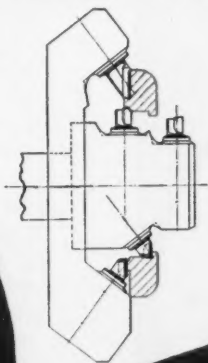
FOR PRECISION WORK  
EQUIPPED WITH  
STANDARD  
MICROBORE TOOLS

BORING ●  
TURNING ●  
FACING ■



*Each tool independently adjusted  
by proven micrometer, vernier principle.*

Illustration shows a special tool  
used in boring and turning a bearing  
housing for farm implements.



There is a Microbore  
representative in your  
area who will be  
pleased to call on you  
for further consulta-  
tion.



ILLUSTRATED  
CATALOG  
MAILED ON  
REQUEST

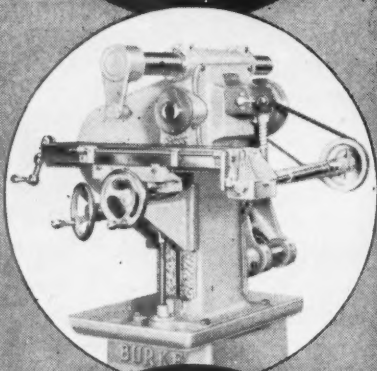
**WOLFE**  
**MICROBORE COMPANY**

100 TAYLOR AVENUE  
ROSELAND, N.J., U.S.A.

# **SPEED PRODUCTION**

**OF SMALL PARTS  
AT SMALL COST**  
with dependable

# **BURKE BENCH MILLERS**



**Bear-for-work**  
Burkes, in hand and power feed models are cutting time and cost on jobs formerly done on big millers in many modern production lines. Versatile Burkes are also on duty in thousands of tool, development, repair and school shops. Send for circulars describing models and attachments.

**THE** *Burke*  
**MACHINE TOOL CO.**

A Division of U. S.-BURKE MACHINE TOOL CO.  
BROTHERTON ROAD 3, CINCINNATI 27, OHIO

in a machine shop is harried by the problem, he should use the following check-list to determine his exemption status.

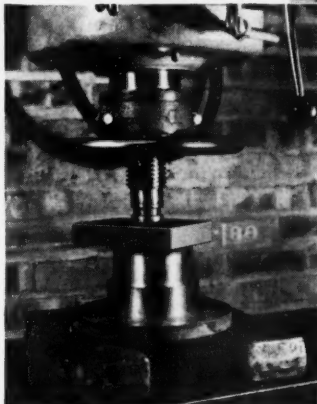
## **1. Executive Foreman is one:**

(a) whose primary duty consists of the management of the enterprise in which he is employed or of a customarily recognized department or subdivision thereof; and (b) who customarily and regularly directs the work of two or more other employees therein; and (c) who has the authority to hire or fire other employees or whose suggestions and recommendations as to the hiring or firing and as to the advancement and promotion or any other change of status of other employees will be given particular weight; and (d) who customarily and regularly exercises discretionary powers; and (e) who does not devote more than 2 per cent of his hours worked in the work-week to activities which are not directly and closely related to the performance of the work described in paragraphs (a) through (d) of this section, provided this paragraph (e) shall not apply in the case of an employee who is in sole charge of an independent establishment or a physically separated branch establishment, or who owns at least 20 per cent interest in the firm in which he is employed; and (f) who is compensated for his services on a salary basis at a rate of not less than \$55.00 per week, exclusive of board, lodging, or other facilities.

**Short-Test Applicable Provided, that an employee who is compensated on a salary basis of not less than \$100.00**

# How \$25. and a DAKE Press

saved \$1,200 worth  
of bushings from  
going to the  
scrap heap!



• Close-up shows bushing being pressed through shrinking die

Through a purchasing error, a manufacturer ordered 286 cylindrical bronze bushings .002" over-size—both inside and outside diameter. Since each bushing cost about \$4.50, it would have meant a loss of more than \$1,200 to scrap them.

So the manufacturer called in a machinist who works wonders with his Dake Hydraulic Press. Together, they figured that by building a tapered die and pressing the bushings through, it might be possible to shrink the bushings the necessary .002" both I. D. and O. D.

The die was made, and the pressing job was so successful that all but two or three of the bushings were salvaged. The die required about four hours to make, and pressing time was another four hours. Total cost of the job—eight hours labor and a small amount for material—less than \$25.

The accurate operation of Dake Hydraulic Presses recommends them for scores of production, maintenance, and salvage operations. Do you have this versatile equipment? ... are you using it to best advantage? ... see your Dake distributor.



Write for  
this Catalog

Dake Engine Company, 612 Seventh St., Grand Haven, Mich.



Arbor Presses



Hand Operated Hydraulic



Power Operated Hydraulic



Guided Platen

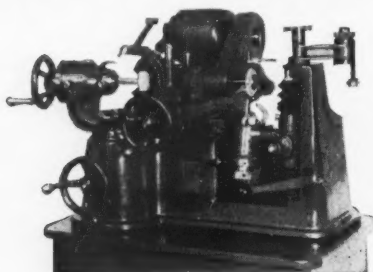


Gap Type Presses



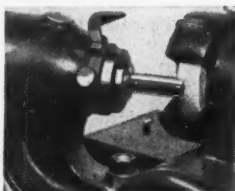
Movable Frame

# HYBCO TAP GRINDER



MODEL 1100

**CHAMFER  
Sharpening**



**FLUTE  
Sharpening**

**GUN POINT  
Sharpening**



- Capacities No. 0 Machine Screw to 1 1/2" Hand Taps.

## Henry P. Boggis & Co.

708 East 163rd Street  
Cleveland 10, Ohio

per week, exclusive of board, lodging, or other facilities, and whose primary duty consists of the management of the enterprise in which he is employed or of a customarily recognized department or subdivision thereof, and includes the customary and regular direction of two or more other employees, shall be deemed to meet all of the requirements of this section.

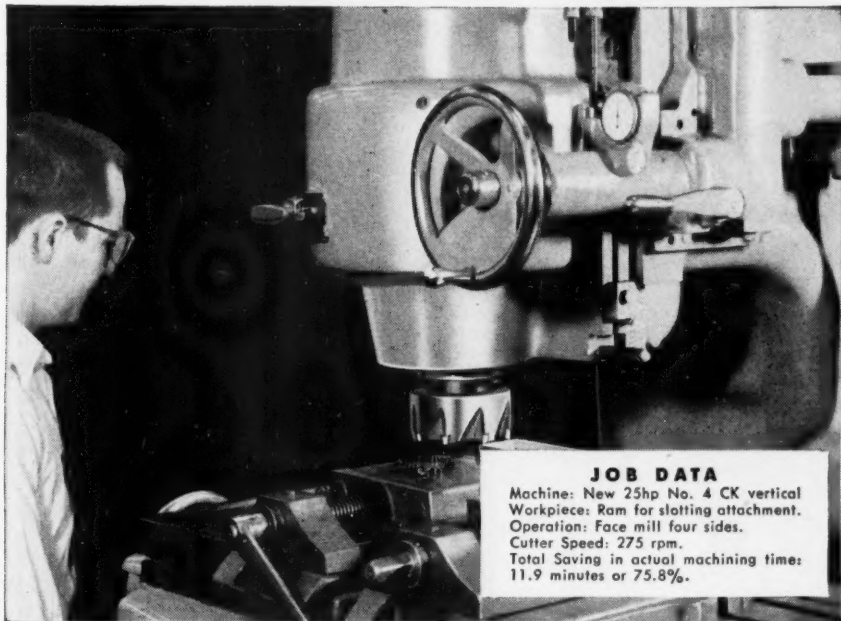
### 2. Administrative Foreman is one:

(a) whose primary duty consists of the performance of office or non-manual field work directly related to management policies or general business operations of his employer or his employer's customers; and (b) who customarily and regularly exercises discretion and independent judgment; and (c) (1) who regularly and directly assists a proprietor, or an employee employed in a bona fide executive or administrative capacity, or (2) who performs under only general supervision work along specialized or technical lines requiring special training, experience, or knowledge, or (3) who executes under only general supervision special assignments and tasks; and (d) who does not devote more than 20 per cent of his hours worked in the workweek to activities which are not directly and closely related to the performance of the work described in paragraphs (a) through (c) of this section; and (e) who is compensated for his services on a salary basis at a rate of not less than \$75.00 per week, exclusive of board, lodging, or other facilities.

Short-test Applicable Provided, that an employee who is compensated on a

FACTS TELL THE STORY...

# NEW KEARNEY & TRECKER CK MILLING MACHINE CUTS PRODUCTION TIME 75%



#### JOB DATA

Machine: New 25hp No. 4 CK vertical  
Workpiece: Ram for slotting attachment.  
Operation: Face mill four sides.  
Cutter Speed: 275 rpm.  
Total Saving in actual machining time:  
11.9 minutes or 75.8%.

#### C-K Milling Machine Features that help do this job BETTER

- Greater rigidity of new CK column easily absorbed vibration from heavy cutting load. Only single pass needed for each part.
- CK's positive lubrication plus generously proportioned gears and shafts assure cool, trouble-free operation under heaviest load conditions.
- CK's 3-bearing spindle and flywheel assured fast metal removal, excellent finish.
- 24 different spindle speeds (13 to 1300 rpm) plus 32 different table feeds ( $\frac{3}{8}$ " to 90" ipm) meant operator selected exact combination to take full advantage of high horsepower and modern tools.
- Smoother Feed of CK's large (2" dia.) screw and extra-long table feed nut permitted heavy cut.
- Greater Horsepower permitted operator to get maximum production from his modern cutter.

It will pay you to see the new CK line of milling machines — check them against your own requirements. You'll notice how every feature is designed and job-proven to give you cost-cutting results — greater machine capacity, productivity and better finished products. So, for the full story, contact your nearest Kearney & Trecker representative or write: Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.



salary basis or fee basis at a rate of not less than \$100.00 per week, exclusive of board, lodging, or other facilities, and whose primary duty consists of the performance of office and non-manual field work directly related to management policies or general business operations of his employer's customers, which include work requiring the exercise of discretion and independ-

ent judgment, shall be deemed to meet all of the requirements of this section.

#### Machine Shop Examples

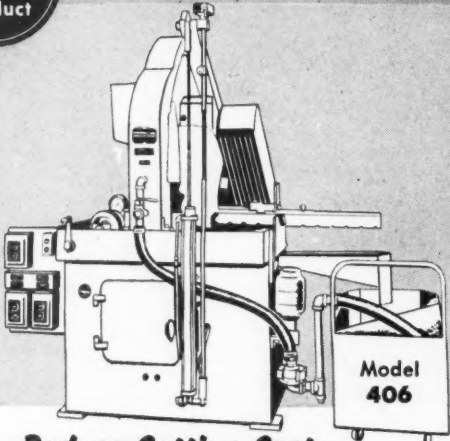
The primary purpose of the exclusionary language placing a limitation on the amount of non-exempt work is to distinguish between the bona fide executive and the "working" foreman or supervisor in a machine shop who regularly performs "production"

or other work which is unrelated or only remotely related to his supervisory duties. Such employees, sometimes known as straw-bosses, or gang or group-leaders, perform the same kind of work as their subordinates, and also carry on supervisory functions. Clearly, the work of the same nature as that performed by the employee's subordinates must be counted as non-exempt work according to the wage-hour office. If the amount of such work is substantial the exemption would not apply.

A foreman in a machine shop who operates a working machine to produce

an  
**ACCO**  
product

**CAMPBELL ABRASIVE CUTTERS**



**Model 406**

**Reduce Cutting Costs**

- Make fast, accurate, close tolerance cuts from hard or soft, round, hex, square, or shaped stock. Work and wheel thoroughly cooled. Wheel entirely enclosed in steel safety guard. Many models. Many automatic features.

Write for "Principles of Abrasive Cutting."

**ACCO**

CAMPBELL MACHINE DIVISION  
AMERICAN CHAIN & CABLE

931 Connecticut Ave., Bridgeport, Conn.

**CAMPBELL  
Abrasive  
Cutters**



A way to save time  
and money on  
bearing jobs...

**START  
WITH  
JOHNSON  
GP  
BEARINGS**



ELECTRIC MOTOR

CAST BRONZE  
GRAPHITED

LEDALOYL  
SELF-LUBRICATING

UNIVERSAL BRONZE

These stock size GP (General Purpose) Bearings are precision made, completely finished and available in over 900 sizes. They are cast in high quality bearing alloy with better-than-average physical properties. You can buy them in required diameters, wall thicknesses and lengths, and save machine time. If oil grooves, slots, holes or other special features are required, this work can be done easily and economically. You will save more money on bearing jobs when you start with Johnson GP Cast Bronze Bearings . . . always available from stock.

**JOHNSON BRONZE COMPANY**  
590 South Mill St. • New Castle, Pa.

ask your  
**JOHNSON**  
distributor

**JOHNSON BEARINGS**  
*Sleeve-B Type*

a certain commodity or product is undoubtedly performing non-exempt work. However, this should not be confused with the operation of a machine



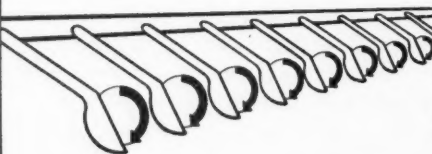
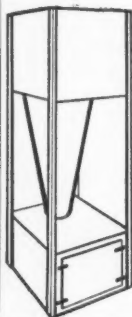
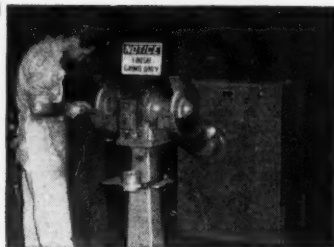
"Such an employee is in effect holding a dual job."

shop by a foreman or supervisor who is instructing his subordinates in the making of a product, before it goes into production.

Another type of machine shop foreman or supervisor who cannot be classed as a bona fide executive is one who spends a substantial amount of time in work which, although not performed by his own subordinates, consists of ordinary production work or other routine production work or recurrent, repetitive tasks which are a

regular part of his duties. Such an employee is in effect holding a dual job. He may, for example, be a combination foreman-production worker, a supervisor-clerk, or foreman combined with some other skilled or unskilled occupation. His nonsupervisory duties in such instances are unrelated to anything he must do to supervise the employees under him or to manage the machine shop department. These are, in many instances, unrelated to anything he formed because the job does not involve sufficient executive duties to occupy an employee's full time. In other instances, the nonsupervisory, nonmanagerial, duties may be the principal ones and the supervisory or managerial duties are subordinate—assigned to the particular employee because it is more convenient to rest responsibility

# STOP DUST With DUSTKOP



Low cost, immediate control of dust from one remote dust source, or from a whole shop!

**AGET-DETROIT CO.**  
207 Main St. Ann Arbor, Mich.

300 cfm to 10,000 cfm per unit (22 models) standard, pre-tested, available from stock.

Ask for catalog  
605-2

No obligation.

# BRYANT INTERNAL THREAD GAGE

MODEL P-11

SPECIFIC READING OF P. D.  
INCLUDES FORM AND LEAD

AT TEN TIMES THE SPEED

The P-11 gives a single dial indicator reading in .0005", of variation from basic size of P. D., form and lead. Interchangeable segments inspect all classes of threads from 5/16" to 5" dia. Pressure on the thumb lever collapses the pair of segments allowing swift engagement of the threads. This 14 oz. portable gage is designed for use in the shop or at the inspection bench. Descriptive literature on this and other Bryant gages is available on request. Send coupon today.

Bench type gages for external or internal threads are available, with or without squareness-of-face attachment.



**BRYANT**  
CHUCKING GRINDER CO.  
Springfield, Vermont, U. S. A.



MAIL THE COUPON TODAY!

**BRYANT CHUCKING GRINDER CO., SPRINGFIELD, VT.**

Please send me illustrated folders giving full information on the Bryant Portable and Bench Thread Gages.  
MMS

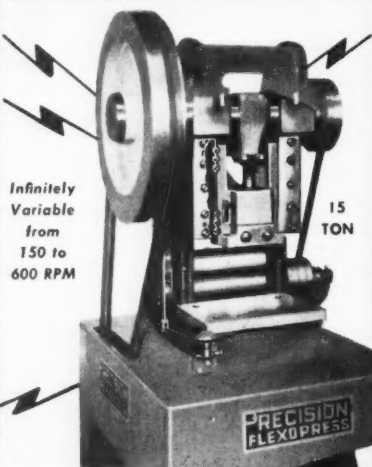
NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

**NEW Smoothness . . .**  
**NEW Efficiency with**  
**BALL BEARING RAM WAYS**



Infinitely  
Variable  
from  
150 to  
600 RPM

15  
TON

FOR QUALITY  
CONTROLLED

**STAMPINGS**

*New!* **ADVANCED**  
**AUTOMATIC HIGH SPEED**  
**FLEXOPRESS**

Precision Flexopress high operating speeds do it faster for less, because complete press range capacity of 1250,000 pieces per 8-hour day! lowers minimum unit cost.

Figures proves faster set-up and more efficient production with light-weight (integrally designed) feed rolls set close to dies for more accurate feed of a wide range of materials.

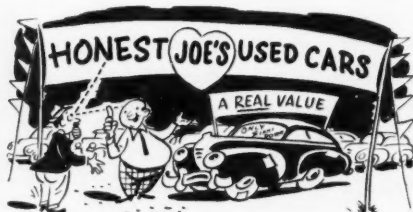
Precision Flexopress respects maintenance costs and delivery promises. We challenge you do it so quickly?

**PRECISION WELDER**  
**& FLEXOPRESS CORP.**

136 E. McMICKEN AVE. CINCINNATI 10, OHIO

for the first line of machine shop supervision in the hands of the person who performs these other duties.

Further, the foreman or supervisor in a machine shop who performs clerical work other than the maintenance of time and production records of his subordinates cannot be classed as a bona fide executive. For example; the foreman or supervisor of the shipping room who makes out the bills of lading and other shipping records; the warehouse foreman or supervisor who also acts as inventory clerk; the head shipper who also has charge of a parts stock room, assisting in placing finished goods of the machine shop on



"Titles are of no determinative value."

shelves and keeping a perpetual inventory record; or even the chief clerk who performs routine bookkeeping for the machine shop.

In other words, job titles are insufficient as yardsticks for claiming a foreman or supervisor in a machine shop is exempted from overtime pay after 40 hours. Titles are of no determinative value. As has been indicated heretofore, the exempt or non-exempt status of any machine shop foreman or supervisor must be determined on the basis of whether his duties, responsibilities, and salary meet all of the FLSA exemptions of the appropriate sections cited above. If the foreman or supervisor in your machine shop does not

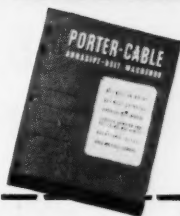
There's a new way . . .  
to increase production

## These **FREE** booklets give the facts on **ABRASIVE-BELT GRINDING**

**"ABRASIVE-BELT FINISHING"**—Explains how abrasive-belt machining provides low-cost, rapid finishing of flat and irregular shaped surfaces. Discusses: (a) grinding of work requiring close dimensional accuracy; (b) contact-roll grinding on metals of various hardness; (c) grinding of irregular contours; (d) selection of abrasive belts.

**"CASE HISTORIES"**—Thirty-six representative examples showing how abrasive-belt machining upped output and slashed costs on many different materials and parts (aluminum, steel, iron, plastics, etc.) in a wide range of industries. Gives factual "before and after" data—compares costs—cites actual savings in time.

**CATALOG—PORTER-CABLE ABRASIVE-BELT MACHINES**—Specifies type of machine best suited to speed production in factory, job shop and tool room on all these operations: close tolerance grinding on flats—squaring—cylindrical surfacing—contour grinding—deburring—beveling and chamfering—forming radii—smoothing parting lines, flashings, welds—polishing.



Manufacturers  
of  
**SPEEDMATIC**  
and  
**GUILD**  
Electric Tools

• Get All the Facts, mail coupon today!

### **PORTER-CABLE** Machine Co.

5169 N. Salina Street, Syracuse 8, N. Y.

Please send me the following free literature on abrasive-belt machining:

- ☐ "Abrasive-Belt Finishing" ☐ "Case Histories"  
☐ Catalog—"Porter-Cable Abrasive-Belt Machines"

Name \_\_\_\_\_

Title \_\_\_\_\_

Firm \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

*In Canada write: Strongridge, Ltd., London, Ont.*

meet all of these "tests," he could not claim exemption.

### Machine Shop Recordkeeping Requirements

Machine shop management must keep accurate and adequate records on all employees, and the foreman or supervisor is no exception to this rule. Complete recordkeeping under the FLSA, 1949 amended, is a must because the first contact a federal agent has with a machine shop management is through the examination of the records. Are your records complete and accurate?



"Are your records complete and accurate?"

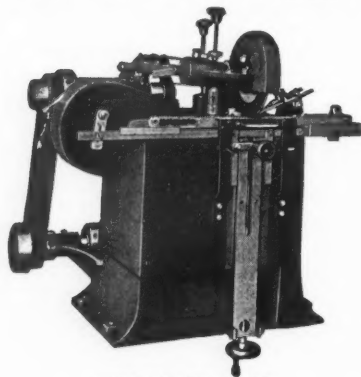
Want to check your corporate machine shop records to see if you have all the following items on your foremen or supervisors?

1. Name in full
2. Home address
3. Date of birth if under 19
4. Occupation in which employed
5. Time of day and name of the day on which the employee's work-week begins
6. Basis on which wages are paid
7. Total wages paid each pay period
8. Date of payment and pay period covered by payment

### Investigators "Quiz" Machine Shop Foremen

Section (a) provides that the Wage-Hour administrator or his duly appointed agents may investigate and gather data regarding the wages, hours, and working conditions and

## INSTEAD OF 2 SHARPENINGS . . . GET 5 or 6 PER BLADE



WILL PAY FOR ITSELF  
IN A MATTER OF MONTHS

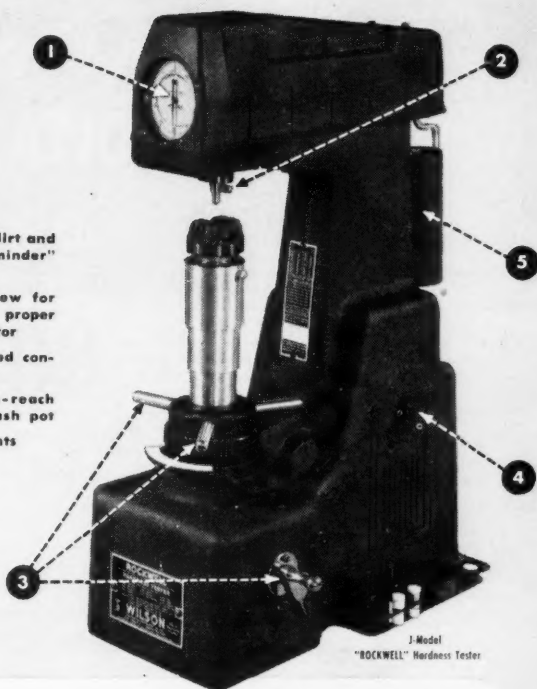
### HACK, CIRCULAR, BAND SAWS

Instead of only 2 or 3 sharpenings per blade the EC Automatic Grinder sharpens hack saw blades 5 or 6 times before they require replacement. The EC is fully automatic grinding from 30 to 75 teeth per minute. This is the only grinder that does not depend on the shape of grinding wheel edge to shape the cutting edge of the tooth. Write for Bulletin EC Combination Hack, Circular and Band Saw Grinder . . . Wardwell Mfg. Company, 3166 Fulton Road, Cleveland 9, Ohio.



## WARDWELL

Maker of largest line of  
saw and tool sharpening machines



- 1 Totally enclosed, dirt and dust-proof "Zerominder" dial gauge
- 2 Gripsel clamp screw for quick change and proper seating of penetrator
- 3 All controls grouped conveniently
- 4 Enclosed, easy-to-reach variable speed dash pot
- 5 Standardized weights

J Model  
"ROCKWELL" Hardness Tester

## 5 Important "ROCKWELL" Features

You can be sure of the hardness of incoming metals and the various parts or products you ship to your customers if you use a WILSON "ROCKWELL" Hardness Tester. Only in the WILSON will you find these five important features which assure accuracy and ease of operation.

There are two types of WILSON "ROCKWELL" Hardness Testers . . . Regular and Superficial. They come in many styles with accessories for testing flats, rods, rounds, and odd shapes. For micro-indentation hardness testing, there is the WILSON TUKON.

*\*Trade Mark Registered*

**ACCO**

Write for information and let us make recommendations



TRADE  
MARK

**WILSON MECHANICAL INSTRUMENT DIVISION  
AMERICAN CHAIN & CABLE**

230 G Park Avenue, New York 17, N. Y.

**WILSON  
"ROCKWELL"  
and TUKON  
Hardness  
Testers**

## Date \_\_\_\_\_

Name of employee \_\_\_\_\_ Pay roll or card No. \_\_\_\_\_

Address \_\_\_\_\_

Occupation \_\_\_\_\_

Basis of payment \_\_\_\_\_

Establishment \_\_\_\_\_

Contract Nos. (PCA) \_\_\_\_\_

(a)	(c)	(d)	(e)	(f)	(g)	(h)
Year and Week Ending	HOURS WORKED	GROSS RATE OF PAY	TOTAL WAGES Paid	TOTAL WAGES Due	Total DUES Withheld	
	Total					

[illegible]

Investigator \_\_\_\_\_ Computed by \_\_\_\_\_ Reviewed by \_\_\_\_\_

U. S. GOVERNMENT PRINTING OFFICE 16-60871-4

a probability under the amended Federal Wage-Hour law.

If the foremen or supervisors in your machine shop are not exempted pursuant to the official "tests" prescribed, your management may have to recompute a sizable amount of additional money for overtime purposes. Because of the sweeping changes in the FLSA, 1949 amended, machine shop management should clearly understand the basic requirements, and particularly

# SHEET & PLATE FABRICATION

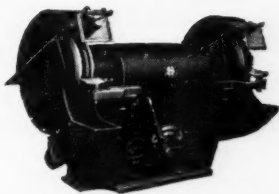
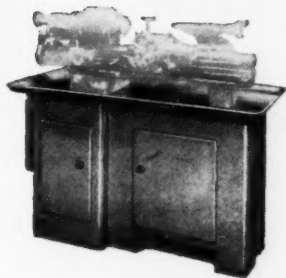
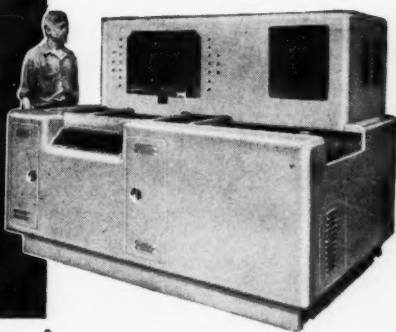
by **KIRK AND BLUM**

## Machine Bases

If you need welded machine bases, pedestals, frames or other fabricated items for your production, call on Kirk & Blum. Complete facilities through  $\frac{3}{8}$ " capacity for all types of fabrications.

Whether it's 1, 100 or 1000 units, Kirk & Blum can produce them promptly and economically.

Modern equipment, in a new, large plant, together with a skilled organization with 45 years' experience assures you of complete satisfaction. For a prompt quotation, send prints to The Kirk & Blum Mfg. Co., 3203 Forrer St., Cincinnati 9, Ohio.



Drive Guards • Louvre Panels  
Cover Plates • Drip Pans • Lathe Pans  
Brackets and Supports • Tanks

# KIRK AND BLUM

**METAL FABRICATION**

**KIPP**  
*Air Grinders*



- **FASTER SPEEDS**
- **BETTER RESULTS**
- **LOW PRICES**

**MODEL JA**  
**50,000 R.P.M.**  
Weight 12 ounces; length 6 3/4 inches; chuck size 1/8 inch. Wheel guard removed for better illustration.

**\$42**  
IN U.S.A.

## THEY GRIND—NOT JUST RUB!

The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind . . . not just rub. Every mechanic knows this, but an inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work . . . longer wheel life.

## MADISON-KIPP CORP.

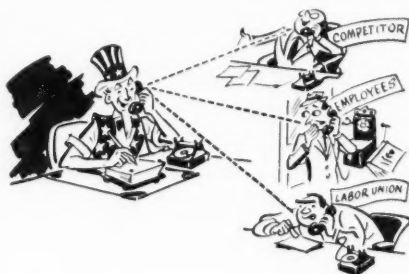
208 Waubesa St., Madison, Wis., U.S.A.

Write for KIPP Air Tool Catalog at 3006

the exemption allowed for foremen fitting into the above categories.

One machine shop official whom I did work for under the FLSA by making an Audit of his records, payrolls and exemption practices, asked me these questions; How does the wage-hour inspector go about making cases against employers? Where do they get their tips? How do they follow them up? If an employer has inadvertently violated the law, how are his chances to settle?

Being a former wage-hour inspector, I can readily say that tips or com-



" . . . tips or complaints arise from various sources . . . "

plaints arise from various sources—employees, competitors, labor unions, and so on. Unless a wage-hour inspector has an air-tight case for willful violations, the investigation is usually settled on an informal basis, that is, providing restitution of back wages are made, and with the assurance that the employer will comply in the future. However, this does not preclude any further inspections, because wage-hour inspectors constantly have employers (machine shops, too) under surveillance. Basically, the Wage-Hour and Public Contracts Division, is more interested in catching chronic

# Consistent Thread Accuracy

Gives You  
Better Tapping  
at Lower Cost



**BESLY  
TAPS**

- Absolute Control of Threaded Form
- Less Drive Power Needed
- Positive Control of Pitch Diameter

## UNSURPASSED ACCURACY at all vital points



Microcentric CHAMFER



Solid Ground THREAD FORM



Mirror Finish FLUTES



Tru-Square DRIVER



"Right" ROCKWELL

### BESLY DRILLS and REAMERS

High-Speed Cutting Tools available in a complete range of types and sizes—made to the same high standards as Besly Taps to reduce your cost-per-hole.

**FREE!**  
CUTTING TOOL  
MANUALS

Just try a Besly Tap on a tough tapping job! See how thread follows through for perfect tapping results. That's because it's ground from the solid to a high degree of accuracy. Then, check these other points of thread superiority:

Accurate **THREAD FORM**—Absolute control of angles and lead eliminates gauging problems.  
Superfine **FINISH**—High polish; less power required to drive the tap.  
Consistent Precision in **SIZE**—Pitch diameter controlled to tenths of thousands—tap to tap.

Besly Taps are produced by new manufacturing techniques and new machinery—much of which is exclusive with Besly. Ask your Besly distributor for a performance test in your plant now.

## BESLY-WELLES CORPORATION

Established as Charles H. Besly and Company in 1875.  
BELOIT, WISCONSIN

BESLY TAPS, DRILLS, REAMERS, BESLY GRINDERS  
and ACCESSORIES, BESLY-TITAN ABRASIVE WHEELS

BESLY-WELLES CORPORATION, 108 Dearborn Ave.,  
Beloit, Wisconsin

Please send Free manuals as checked.

☐ TAP APPLICATION GUIDE ☐ TAP CATALOG  
☐ DRILL CATALOG

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

rather than occasional technical violators. With a judicious combination of education and enforcement, it believes it can do a respectable job. On the other hand, as the press releases have indicated, the wage-hour and public contracts division has found that there is nothing like a few well chosen court cases to clean up any area of noncompliance.

Most machine shop managements are fully conscious of their responsibility under this monumental labor law. Some, however, do not have a clear understanding of its basic requirements and unwittingly subject themselves to heavy penalties thereof.

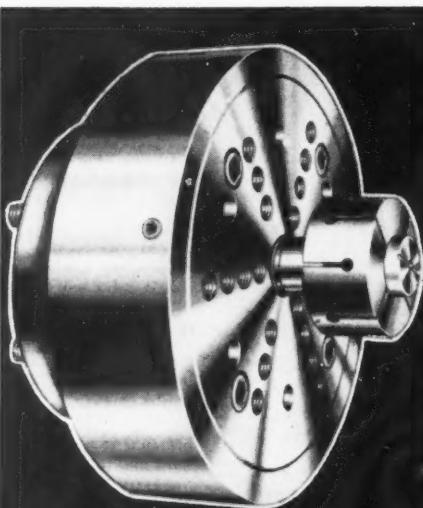
For years, machine shops have had to go along with wage-hour inspectors in determining which employees are exempted and which foremen were being paid adequately under the FLSA.

Today, they have to be concerned about paying too much under the Wage-Salary stabilization program. It all adds up that machine shop management and foremen owe it to themselves to have a complete knowledge of the exemption provision to avoid costly errors.



"... knowledge of the exemption provision to avoid costly errors ..."

After all, overtime pay is expensive enough without making unwitting mistakes insofar as misclassification of foreman or supervisor. Hence, this all requires analysis of the payrolls and records with regard to the exemption status of any foreman in a machine shop.



## 9 Reasons for You to get the Facts on SPEEDGRIP CHUCKS

1. They increase production.
2. They give greater accuracy.
3. Set-up time is shorter.
4. They are safer to operate.
5. First cost is low.
6. Maintenance cost is low.
7. Design is simple.
8. Guaranteed to do the job.
9. Service is prompt.

**Speedgrip Chucks will save you money on second operation work.**

**WRITE FOR FREE MANUAL**



# SPEEDGRIP CHUCK

820 N. WARD STREET  
ELKHART, INDIANA



## 16 Foot Lathe Bed Wear Strips *Quick Aged* in SUB-ZERO Unit

18 foot Sub-Zero  
—120° F. Chilling  
Machine in which  
parts are quick  
aged. Unit has two  
covers on single  
opening for easier  
handling.

For Full Details  
Write for  
New Catalog

This Sub-Zero Industrial Chilling Machine plays a vital part in a unique steel treating line for lathe bed wear strips recently installed at the Cincinnati Steel Treating Co.

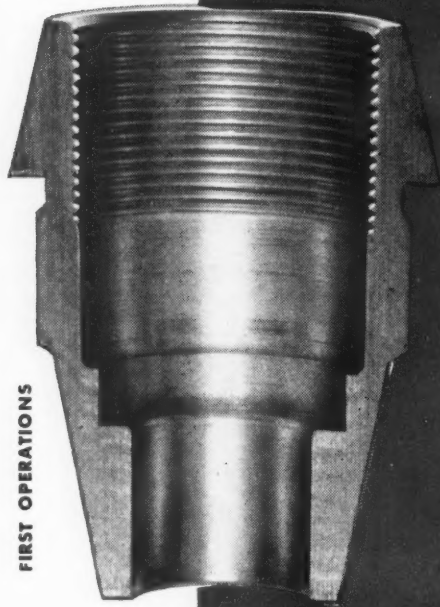
After flame hardening, temperature of the strips is about 80° F. They are then put into the Sub-Zero unit, and held for a period of 24 hours at —120° F. The result of this chilling is a complete transformation of the austenite to martensite, producing full stabilization. A second result is a major improvement in surface hardness. The parts are ready for finish machining and grinding to final dimensions after a draw to thoroughly temper the martensite.

Several Sub-Zero models for large or small shops save time and money by: Shrink fitting without forcing, increasing perishable tool life, and obtaining 100% stabilization of alloy steel.

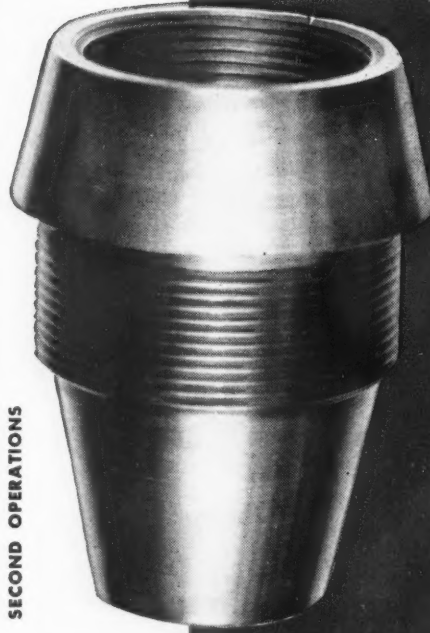


SOME EXCLUSIVE  
TERRITORIES NOW OPEN  
TO DEALERS

FIRST OPERATIONS



SECOND OPERATIONS



**ACME-GRIDLEY PERFORMANCE...73 SECONDS!**  
for complete machining of this familiar steel job

**1.** The first 15 operations are done on a 3½" six spindle Acme-Gridley Bar Automatic in ..... **57 SECONDS**

**2.** The secondary operations are done on a double indexing 8" eight spindle Acme-Gridley Chucking Machine (2 per cycle) at the rate of ..... **16 SECONDS**

---

**Total multiple spindle machine time ..... 73 SECONDS**

A  $2\frac{1}{16}$ " Namco Collapsible Tap and a  $3\frac{1}{2}$ " five chaser Vers-O-Tool, both with ground thread chasers, cut the smooth 12 NF class 2 threads.

Here is another outstanding example of the economies that result from studied tool engineering co-ordinated with time-proved machine design—a combination for which The National Acme Company is justly famous. *Again we say:*

**No other source offers a line so complete—so much design and tooling experience in multiple and single spindle bar and chucking automatics—more than 45,000 machines built.**



Whether for defense or civilian production, it will pay you to ask for Acme-Gridley's production figures on the work you are doing or contemplate. Send prints or samples.

**The NATIONAL ACME CO.**

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics:  
1-4-6 and 8 Spindle • Hydraulic Thread  
Rolling Machines • Automatic Threading Dies  
and Taps • The Chronolog • Limit, Motor Starter  
and Control Station Switches • Solenoids  
Centrifuges • Contract Manufacturing

# Chucking Fixture for Contoured Workpieces

The author's actual experience in designing a fixture for tapered spindles.

By W. M. HALLIDAY

AS a result of machining and inspection errors, a quantity of short groove tapered spindles, in mild steel, of the kind illustrated at **X** Fig. 1, has to be re-machined across the smallest diameter end in order to correct the critical dimension **Y**.

The spindle comprises two tapered portions—the longest situated at the right of the annular groove being 5 deg. taper per side, and the shortest portion is 7½ deg. side taper. The shallow annular groove 'x' is 90 deg. included angle with a vee form. Dimension **Y** from the center of this groove to the right hand end of the part had inadvertently been machined 0.025 in. too long. This amount of material had thus to be faced off the smallest end-face to correct the length. The tolerances on dimension **Y** were to be held to plus or minus 0.002 in., but the length from the center of the groove to the largest diameter end was subject to much wider limits, that is, plus or minus 0.008 in.

Both endfaces of the spindle had been machined flat and truly concentric with the length axis. At the large end is a shallow blind hole bored concentric with the outside diameter to similarly close limits. No standard center-bit holes was permissible in the

small diameter end. The dual tapers had been accurately ground to size and smoothly polished for bearing purposes.

From this description of such an unusual shape of component, it will at once be apparent that several serious objections were encountered when determining exactly how such wholly machined spindles were to be located accurately and retained effectively for the corrective machining operation.

The absence of any parallel cylindrical portion prevented these parts being gripped in conventional manner in the self-centering three-jaw chuck. The inability to provide a center hole up the small end likewise forbade mounting the parts on the ordinary centers. Owing to the highly polished character of the exterior, no form of gripping could be entertained at this second machining stage which would incur the risk of inflicting damage or marks on those surfaces.

The greatest difficulty, however, arose in regard to the manner in which such components were to be accurately located from the center of groove 'x' so that the stipulated tolerances could be maintained on dimension **Y**.

Because of the large quantity of parts to be treated in this manner, the

chucking method had to involve the simplest possible setting operation, and the most economical handling to provide satisfactory production of the parts.

The half-sectioned front elevation and endview diagrams Fig. 1, show the simple design of chucking fixture developed to overcome the foregoing

locating within the recess in the front of the standard faceplate of the lathe. It is bolted permanently to the latter by bolts passed through holes **D** in the flange. This method of mounting ensures the accurate centralization of the fixture and absence of spring.

The forward portion of the body is bored at **E**, concentric with the projec-

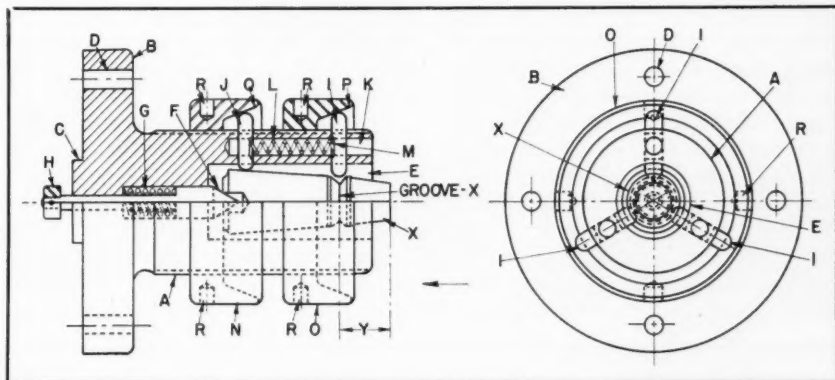


Fig. 1—Drawing illustrating design of special chucking fixture for locating and holding contoured workpieces.

objections. Use of a fixture of this construction permitted the spindles to be mounted and located very simply, in rapid manner and to the closest accuracy directly from the critical vee groove 'x'. A very substantial gripping pressure was obtained in a safe manner so that the polished tapered surfaces were completely undamaged. Excess material was removed from the small diameter end at a single pass of the facing tool to maintain dimension **Y** to the necessary fine limits over the entire large batch of parts.

The cast-iron cylindrical body **A** of the fixture has the enlarged integral circular flange **B** at the left, which portion has the circular projection **C** for

tion **C**, and to a diameter appreciably larger than the maximum diameter of the spindle **X**. In depth, this hole is extended a sufficient distance to permit about  $\frac{3}{8}$  in. projection of the small end of the spindle out of the right hand end of the fixture as shown.

A hardened and ground steel plunger **F** is mounted to slide closely within a hole drilled completely through the body, this being situated central with large bore **E**. The inner end of the plunger is conical in shape, to 60 deg. included angle, for engagement within the short blind hole in the large end of the component. A compression spring **G** is interposed between the shoulders of the plunger and its guide hole to

urge it forwardly a small amount into bore **E**. A steel collar **H** cross-pinned to the reduced shank of the plunger at the extreme left hand side of the projection **C** checks the amount of lateral movement imparted to the member.

Three ground cylindrical pins **I**, of identical diameter, and having their overall lengths machined within plus or minus 0.005 in. variation, are situated in holes drilled through the walls of the body near its right hand end. These holes are disposed equi-distantly around the circumference and are all exactly the same distance from the right hand end of the body. The pins slide very smoothly within the guide holes with the minimum amount of working clearance.

The three pins are accurately rounded at each end, and when mounted, each pin rests with its lower end with-

in the vee groove 'x' of the spindle, by means of which the latter will be located correctly in endwise relationship.

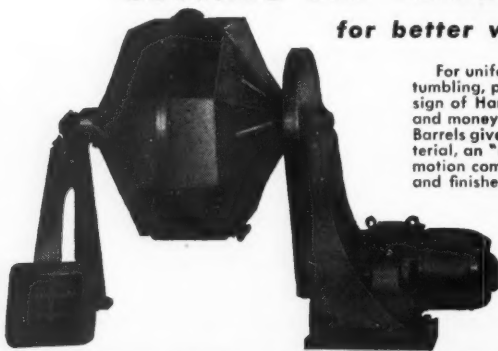
Three similar pins **J**, of slightly shorter length, however, are disposed in like manner within the body walls near the flange **B**. The inner rounded ends of these members bear upon the plain tapered surface of the spindle component in the manner illustrated. Each pair of pins **I** and **J** may be axially in line with each other as here shown, though this is not a critical requirement.

The pins are made in hard brass to avoid marking the surfaces of the work. To restrain them against accidental displacement and movement when a spindle component is withdrawn from bore **E**, three holes **K** are drilled in the walls of the body, each being in line with a pair of pin guide

## HARTFORD TRIPLE ACTION

### CUTTING and TUMBLING BARRELS

*for better work in less time!*



For uniform cutting down, wet or dry grinding, tumbling, pulverizing and mixing, the unique design of Hartford Triple Action Barrels saves time and money and produces better results. Hartford Barrels give a TRIPLE ACTION in tumbling the material, an "over and over, end to end, folding-in" motion combined, which quickly grinds off burrs, and finishes and smooths the general surface of any article in the load. These barrels are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burnishing balls scientifically correct in design and material for each specific job. Bulletin on request.

## THE HARTFORD STEEL BALL CO. HARTFORD 6, CONN.

DETROIT  
W. S. TURNER  
445 NEW CENTER BLDG.

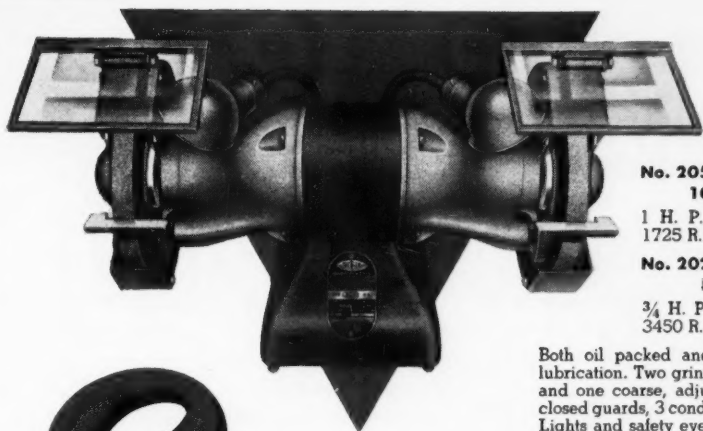
CHICAGO  
VICTOR H. CLARK  
605 W. WASHINGTON BLDG.

NEWARK, N. J.  
GUARANTEE TRUST BLDG.  
972 BROAD ST.

LOS ANGELES, CAL.  
E. D. MALLOY CO.  
1718 SOUTH FLOWER ST.

EXPORT  
R. A. RODRIGUEZ, INC.  
55 W. 42ND ST., NEW YORK

24502



**No. 2050 HEAVY DUTY  
10" BENCH GRINDER**

1 H. P. Ball-bearing motor,  
1725 R. P. M.

**No. 2024 HEAVY DUTY  
8" BENCH GRINDER**

$\frac{3}{4}$  H. P. Ball-bearing motor,  
3450 R. P. M.

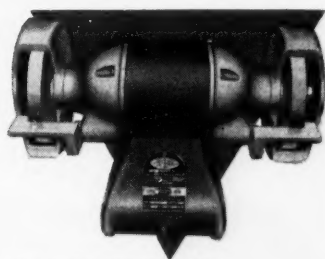
Both oil packed and sealed, no further lubrication. Two grinding wheels, one fine and one coarse, adjustable tool rests, enclosed guards, 3 conductor cable and plug. Lights and safety eye shields extra.

# Sioux

**Highest Quality**

## BENCH GRINDERS

**Each Unit Self-Contained**



**No. 2017 HEAVY DUTY  
7" BENCH GRINDER**

$\frac{1}{2}$  H. P. Ball-bearing Motor, 3450 R. P. M. Oil packed and sealed, no further lubrication. Two grinding wheels, one fine, one coarse, adjustable tool rests, enclosed guards. 3 conductor cable and plug.

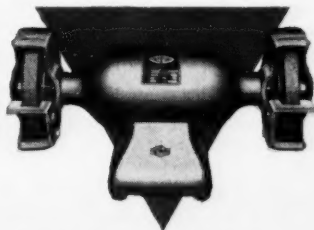


**No. 2062 PEDESTAL**

With water pot and tool tray for all Sioux Bench Grinders

**No. 2065 - 6" BENCH GRINDER**

$\frac{1}{3}$  H. P. Ball-bearing Motor, 3450 R. P. M. Oil packed and sealed, no further lubrication. Two grinding wheels, one fine, one coarse, adjustable tool rests, 3 conductor cable and plug.

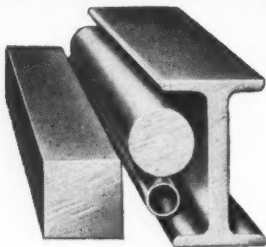


Sold only through Authorized SIoux Distributors

**ALBERTSON & CO., INC.**  
SIoux CITY, IOWA, U. S. A.

# Atlantic

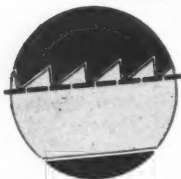
## WAVY SET BANDS...



### FOR FASTER—MORE ACCURATE GANG CUTTING!

Specially designed teeth clear away chips for speedier—cooler—precise cutting. Atlantic Wavy Set Bands have precision milled, even set teeth that slice through multiple drill rods, bar stock, I beams or tubing for gang cutting efficiency.

### ATLANTIC QUALITY CONTROL STARTS HERE . . .



Atlantic engineered with a wave of teeth to the left, then to the right to sweep away chips during cutting. Saw operation is Free! Easy! Efficient! Better finishes result with no chips to score or mar work.

The band saw teeth—and only the teeth—are scientifically hardened to guarantee the sharpest, keenest cutting edge. The entire saw body remains flexible. This precision heat treating increases blade life—saves blades, down time and dollars!



holes. See left hand diagram. Situated within this clearance hole and between pins **I** and **J** is a light compression spring **L**, each end of which bears upon a shallow flat **M** formed on the adjacent side of each pin. Flats **M** are of sufficient length to permit about  $\frac{1}{8}$  in. sliding movement of the pin within the body.

The cylindrical steel sleeves **N** and **O** are identical in size and form, each being a close screwing fit over the threaded exterior of body **A**. The threads on the latter extend for the full length as shown to allow easy mounting of the sleeves during assembly, and so on.

At its right hand side, each sleeve has the bore enlarged to form the conical recesses **P** and **Q** respectively. These portions are machined exactly concentric with the bore **E** and with this present example have their sides inclined approximately 25 deg. In depth, the recesses extend for about half the thickness of the sleeves as shown in the view at the left. The inclined surfaces of the recesses are finished smooth and case-hardened to ensure best engagement and minimum frictional contact with the rounder (upper) ends of the pins **I** and **J**.

In the periphery of each sleeve a number of the usual pin holes **R** are provided to allow additional and greater turning pressure to be applied when adjusting the sleeves into their locked position when the fixture is loaded with a spindle component for facing. The outer surface of each sleeve may also be knurled to enhance hand gripping facilities.

### Using the Chucking Fixture

After the fixture has first been correctly mounted upon the lathe face-

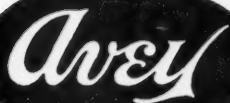
**FREE!**

This pictorial story on Atlantic Wavy Set Bands. Send for your copy today.

# Atlantic

ATLANTIC SAW MFG. COMPANY, Inc.  
158 Brewery St., New Haven, Conn.





## AUTOMATIC UNITS

**for Drilling • Tapping • Reaming •  
Hollow Milling and Deep Hole Drilling**

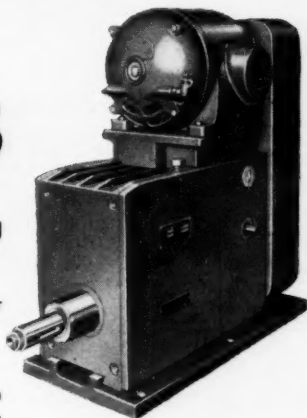
*Vertical, Horizontal or Angular Mounting*

Units are universal in application . . . let us show you their application to your job.

Made in two sizes—No. 1 and No. 2 Morse Taper.

This simple unit gives high production at a lower cost. When used in multiples to complete operations, no relocation of part is necessary, thus producing more accurate work.

Semi-skilled operators will deliver high production accurately and efficiently, yet with a minimum of supervision.



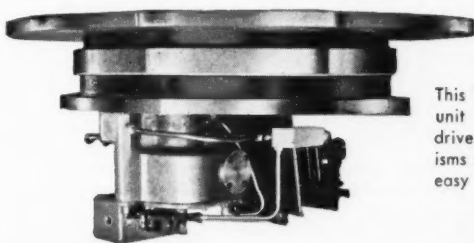
*Here is a packaged unit  
that will simplify your*

**HIGH PRODUCTION  
PROBLEMS**

---

## AUTOMATIC INDEX TABLE

**Meets Demand For Drilling and Tapping Equipment**



**Made in sizes 16", 20", 24", 30",  
and 36" diameter. Indexes, 3 to 12  
stations.**

This Index Table is a self-contained unit, built on unit construction principle and includes motor drive assemblies. All drive and control mechanisms underneath table for free work surface . . . easy accessibility.

Consult the yellow pages in your phone book  
—under Machine Tools—for our nearest representative, or write direct to our factory.

**THE Avey DRILLING MACHINE CO.**  
**Cincinnati 1, Ohio**

plate, to give true running, a workpiece may be inserted. This will be accomplished very simply and quickly merely by screwing both sleeves **N** and **O** a slight amount towards the flange **B**, thereby releasing the pressure on pins **I** and **J**.

The workpiece is inserted large end foremost into bore **E** with the blind hole resting firmly on the conical tip of plunger **F**, which thus serves to bring that end of the part into the central position. A light end pressure is applied to the part to bring the vee groove 'x' approximately underneath pins **I**.

The correct endwise location and centralization of the right hand end of the spindle component **X** is then obtained by adjusting sleeve **O** to the right which action will cause the three pins **I** to be depressed gradually with-

in the walls of the body and into bore **E**. These members will move in simultaneous fashion and in equal amounts by their contact with the inclined sides of the recess **P**. When sleeve **O** has been adjusted a sufficient amount, the pins will be pressed firmly into the vee-groove **X** and, as a result, the spindle will be aligned in the correct endwise position as well as being accurately centralized with the body.

During such location movements, plunger **F** may be pressed back a slight distance; or alternatively, if the spindle should move to the right due to the engagement of the pins in groove 'x', the plunger will instantly be urged to move similarly by the pressure of spring **G**. Thus, the purpose of the plunger will be to maintain the component reasonably central so that pins **I** may readily engage and align them-

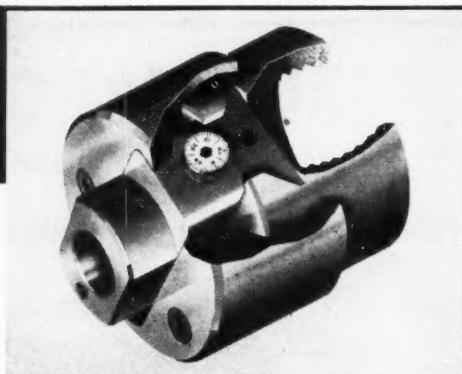
## **SAMSON** Offset BORING CHUCKS

**THESE JOB-PROVEN FEATURES WILL  
SAVE YOU TIME AND MONEY**

- Quick tool change
- Positive dead-centering
- Precision offset adjustment
- Rugged tool support
- Safety round contour

**Complete Boring Chuck  
Accessories Available**

**WRITE FOR COMPLETE DETAILS**



Manufacturers of  
**FAMOUS  
LAST WORD**  
WHEEL  
DRESSER



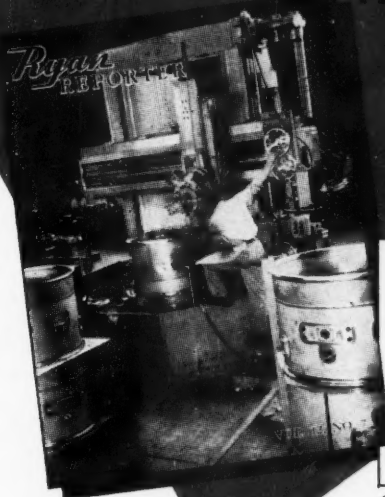
**LAST WORD SALES CO. • 18500 Mt. Elliott • Detroit 34, Mich.**

# Ryan's

## photogenic BULLARD CUTMASTER VERTICAL TURRET LATHE

Once again the Reporter  
has selected this machine  
as a highlight.

It previously appeared in Vol. 12 No. 2  
March 15, 1951 issue of the Reporter



VOL. 12 NOV. 1, 1951 No. 7

*Published By*  
Ryan Aeronautical Company  
Lindbergh Field  
San Diego 12, California  
Francis L. Kohl, art and production editor  
William P. Broderick, technical editor  
Harold Keen, associate editor  
Robert F. Smith, news editor  
Don Diers, chief photographer  
William Wagner, editorial director



B-17 Bombers are precision turned on vertical turret lathes. This exhaust case converts G-8 J-47 turbojet into afterburner version with added kick.

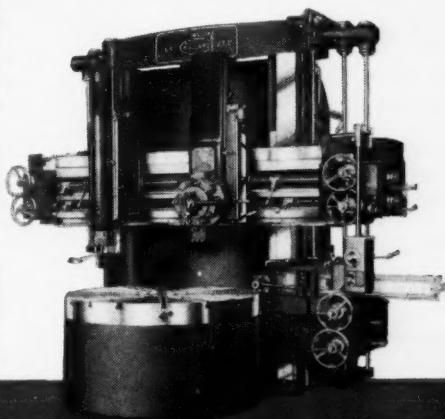
ON THE COVER

In Bullard Machine Company incorporated the Engineering Experience of the past and the knowledge of present requirements. This, naturally, results in Engineering Design for the Utmost in manufacturing Accuracy, Production and Economy of Operation.

Ryan Aeronautical Company in using illustrations of machinery in their plant signify the pride and faith they place in their selection of outstanding manufacturing equipment.

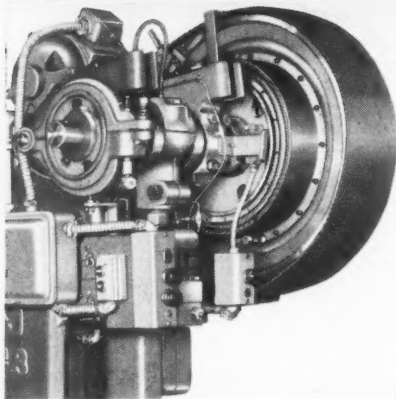
Bullard Engineering Service is available to assist YOU with manufacturing problems. Call on this Service and Know more about the Bullard Line of Machine Tools as applied to your work.

Write for Complete Information



THE BULLARD COMPANY BRIDGEPORT, CONN.

**MORE**  
**Speed – Safety**  
**Production**  
 with  
**L & J - FAWICK**  
**AIR CLUTCHES**



Here's the answer to more production — L&J Presses equipped with L&J-Fawick Air Clutches and variable speed drives. This unbeatable combination gives you more speed with greater safety through rapid, shock-free, full-power operation. Let us show you how these L&J Presses can speed-up your press work.

Send for catalog — 12 O.B.I. models, flywheel and back geared, 6 to 80 tons.



selves with the groove 'x'.

To complete the gripping of the part it will only be necessary to adjust sleeve **N**, so that the three shorter pins **J** will be similarly actuated and brought to bear on the tapered sides of the part, as shown in the half-sectioned diagram. Extra locking pressure is imparted to both sleeves, and so on, by a pin in the holes provided.

The facing tool is pre-set the correct distance from the center axes of the three pins **I** so that dimension **Y** is maintained.

A chucking fixture employing this same principle of gripping and location may be adopted for holding workpieces having a variety of contoured external shapes, which cannot be gripped by ordinary chucks, or mounted between centers in the usual manner.

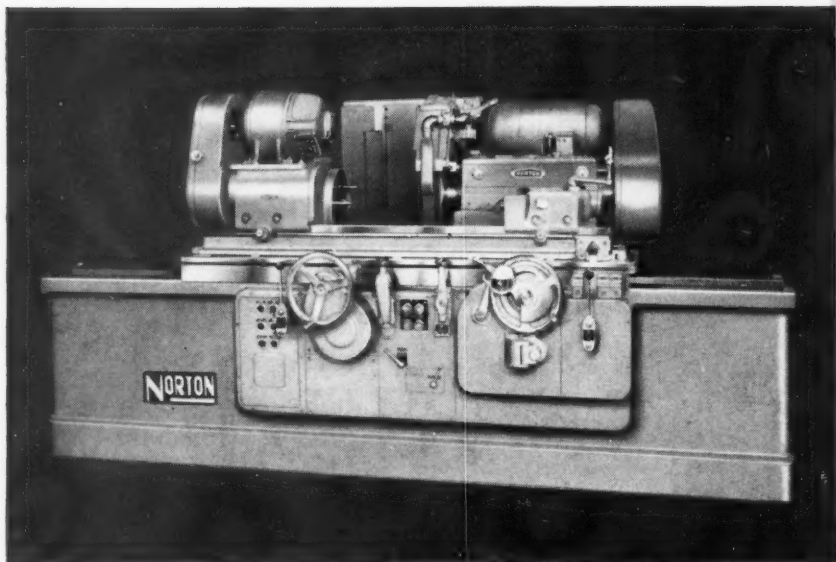
For components which are not highly polished on the exterior, and/or where slight marking is of no importance, pins **I** and **J** may be in hardened steel. This will give much longer working life and closer accuracy in setting. All other parts of the fixture with the exception of the cast-iron body should be hardened and fitted to close working limits to ensure strict accuracy on finished work over large quantities.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.



**HERE'S THE COMPLETE "ACORN" STORY** — a Body, a Die, a Cap. Put them together and you have a really positive, rugged and accurate high production threading tool. And the test plug packed with every "Acorn" Die is tangible proof that it has been **performance tested** at the factory. Cutting sizes #0-80 to 1½"-12". Holders, including a releasing model, for many types of machines.

**GREENFIELD TAP and DIE CORPORATION**  
GREENFIELD, MASSACHUSETTS



**NORTON 10" TYPE CTU** Semiautomatic Grinder is first choice on production lines and in job shops. No other cylindrical grinder offers you such a unique combination of speed, accuracy, flexibility and sturdiness. Norton 10" CTU's have doubled production . . . replaced 2 or 3 machines . . . eliminated extra operations . . . made operators more productive. *Catalog No. 1787* gives you complete data.

*You get better  
and faster cylindrical*

### **With Norton Type CTU Semiautomatics**

*Heavy stock removal?*

*Consistently fine finishes?*

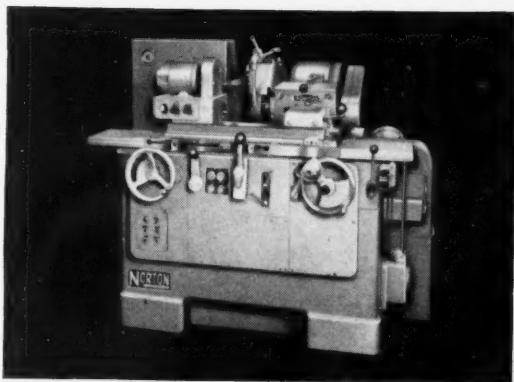
You get either or both . . . easier and faster . . . with a Norton CTU Semiautomatic Cylindrical Grinder.

Your operator simply loads the work . . . touches one lever . . . and stands by while the machine does the rest . . . as easy as 1-2-3.

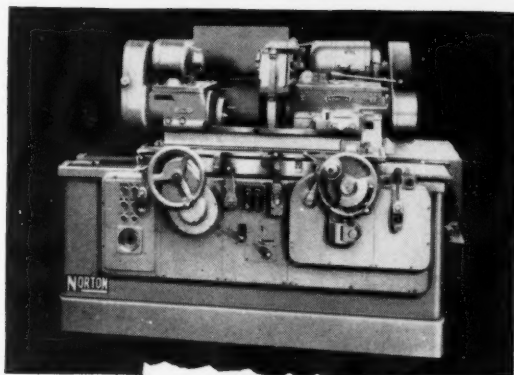
Work is automatically ground to size under electric timer control . . . and the wheel head resets itself for the next cycle.

All three basic Norton CTU Semiautomatic Grinders: 4", 6", and 10", offer you the same advantages over their different ranges of work sizes. You can also get the 6" grinder with a 10" swing and the 10" grinder with a 14" swing by specifying Type LCTU. The

**NEW NORTON 4" TYPE CTU** Semiautomatic Grinder in 12" and 18" work length capacities now makes it practical for you to apply Type CTU high-speed, high-finish grinding to small parts. *Catalog No. 531* gives you full details.



**NORTON 6" TYPE CTU** Semiautomatic Grinder, in 18" and 30" work length capacities, has a performance record that's worth investigating. *Catalog 1488* tells the whole interesting story.



## grinding

Norton line of Type CTU Cylindrical Grinders also includes plain machines for traverse grinding. Your Norton Representative will be glad to help you choose the one that best fits your requirements.

For complete information, write us direct for the catalogs listed under the machine illustrations. **NORTON COMPANY**, Machine Division, Worcester 6, Mass.

To Economize, Modernize  
With NEW

**NORTON**

**GRINDERS  
and LAPPERS**

*Making better products  
to make other products better*

District Sales Offices: Hartford • New York  
Cleveland • Chicago • Detroit  
In Canada: J. H. Ryder Machinery Co., Ltd.,  
Toronto 5



## ALLEN SCREW ... SOCKET SCREW

*mean the same thing everywhere!*

Although *Allen O Screw* is not in the dictionary, engineers and production men the world over say *Allen O Screws* to refer to *precision socket screws*.

That's how it is with names — probably there's a name that comes to your mind at once as an outstanding *Industrial Distributor* in your locality.

He is almost certain to be the one who handles *Allen O Screw* products. His experience and extensive stock of Allen O products are the ideal combination to smooth out any problems you encounter in precision fastenings.

THE **BUY** WORD IN SOCKET SCREWS IS **ALLEN**



## Important Meeting Dates

### September 29-30

Twenty-Eighth Annual Meeting of American Machine Tool Distributors' Association, The Cavalier, Virginia Beach, Virginia.

### September 29-October 1

Eighth Annual National Electronics Conference, Hotel Sherman, Chicago, Illinois.

### September 30-October 3

Iron and Steel Exposition and Annual Convention of the Association of Iron and Steel Engineers, Cleveland Public Auditorium, Cleveland, Ohio.

### October 14-16

Seventh Annual Industrial Packaging and Materials Handling Exposition sponsored by the Society of Industrial Packaging and Materials Handling Engineers, Chicago's Coliseum, Chicago, Illinois.

### October 20-24

Fortieth National Safety Congress and Exposition at Hotels Conrad Hilton, Congress, Morrison and Sheraton, Chicago, Illinois.

### October 20-24

National Metal Congress and Exposition, Philadelphia Convention Hall, Philadelphia, Pennsylvania.

### October 26-29

American Gear Manufacturers Association Semi-Annual Meeting, Edgewater Beach Hotel, Chicago, Illinois.

### October 29-31

Fifth Annual American Institute of Electrical Engineers Machine Tool Conference, Hotel Ten Eyck, Albany, New York.

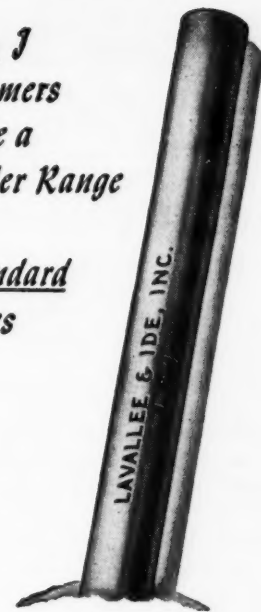
### November 5-7

Sixteenth Annual Time and Motion Study and Management Clinic sponsored by the Industrial Management Society, Sheraton Hotel, Chicago, Illinois.

### December 1-6

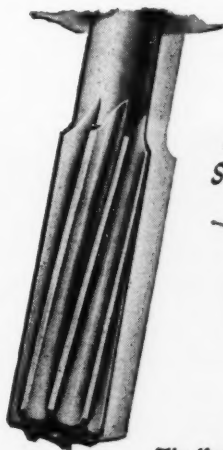
Twentieth National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York.

*L & I  
Reamers  
have a  
Wider Range  
of  
Standard  
Sizes*



*Large Sizes*

TO 1½"



*Small Sizes*  
TO .040



*The Reamer Specialists*

**LAVALLEE & IDE, INC.**

**CHICOPEE, MASS.**

# The Low Down on Air Gaging

In which the author explains the operating principle, use and care of air gaging equipment.

By C. W. KENNEDY

**I**N the last decade, air gaging has earned a stable niche for itself in industrial measurement. From a relative curiosity or a gage laboratory instrument, the air gage has grown up to be a practical machine shop measuring tool and, in many cases, an absolute necessity for dimensional control in high speed, precision production.

Yet, too many machine shops are blinding themselves to the practical energy saving, speedy but extra precise gaging secured with air gages. They shy away from air gaging sometimes because it seems simply some-

thing new fangled. Yet only a few years ago, the deep freeze, television, automatic transmissions and a plane trip were also new fangled.

Some machine shops have adopted the false conclusion that air gages are for the big mass production fellows only. Such reasoning might sensibly apply to machines, gages and equipment specifically designed for and restricted to whipping out a single product or part. But the air gage is not a specialized instrument; industry is only at the threshold of its potential manifold and considerably universal measuring uses.

Unquestionably too, many machine shops turn thumbs down on air gaging because of the inclination to confuse price with cost. So far as gages are concerned, the only part price should play is to compare competitive designs. The right gage costs nothing. Unless the use of any gage reduces scrap or rework, or if such losses would invariably rise without it, no one should buy, keep or use that gage no matter how low its price.



Illustration showing a typical air gaging arrangement.

As an example, a recent cost study in the manufacture of a hydraulic valve body brought out the following information. Unless .0005 in. tolerances could be held on the automatics at the drilling and reaming stations, subsequent grinding and honing operations never succeeded in their tasks of producing leak proof valves.

Traditionally a plug gage made in the tool room, which cost \$15, had been used by the automatic's operator to check his work, and management was happy over the apparent economy in the cost of gaging equipment. But, traditionally also, the automatic's output had to be sorted over by a part time inspector carefully using another \$15.00 plug gage. The culls averaged, daily, 17 per cent. They cost, as plain metal scrap, \$12.24 a day.

These drops on the stone—daily scrap, reoperation, part time inspection payroll—wore away, however, \$3862.45 of the year's profits, the loss a comprehensive and impartial cost accounting disclosed.

An air gage in the hands of the operator on this job slowed scrap and reoperation losses down to 1.8 per cent and the 100 per cent inspection was eliminated. The remaining scrap cost \$0.22 a day and the resultant total annual saving was \$3807.45. Against this, \$435.70, plus express and a connection to the shop air line, had been invested. All of which says nothing of a 40 per cent reduction in the quantity of rejected "leakers" after valve assembly. Air gage equipment may seem high priced but it is not costly. In this example the \$15.00 gages cost plenty.

While an air gage readily measures outside diameters, thickness, width and other dimensional characteristics, of all the gaging family it usually han-

### About the Author



Clifford W. Kennedy

**A**FTER graduating from the Worcester Polytechnic Institute in 1917, Clifford W. Kennedy joined the Remington Arms Company as a factory engineer, for the duration of World War I. He then served the M. S. Wright Co., Worcester, Mass., successively as Product Design Engineer, Service Manager and finally as Assistant Sales Manager.

At the start of World War II he rejoined the Remington Arms Company as Chief Inspector at the Denver Ordnance Plant. This brought him an intimate and thorough knowledge of the application of statistical and other Quality Control methods to the manufacture of the various components of military ammunition.

In his recent position as Quality Control Engineer for the Federal Products Corporation of Providence, R. I., he has extended and diversified his experience in the study of practical Quality Control in a great many plants and factories throughout the country.

Mr. Kennedy is a Fellow of the American Society for Quality Control. He is the author of *Quality Control Methods* (Prentice-Hall, New York) and *Inspection and Gaging* (Industrial Press, New York) as well as a succession of technical magazine articles.

dles best the generally troublesome chore of accurately measuring and controlling I.D.'s—hole sizes. One particular reason why is the faculty an air gage plug has for locating itself correctly and automatically in the hole being measured. Since its use demands no special skill or practice, the green hand, the novice, gets just as accurate readings as the seasoned mechanic.

Bore gages of other types require some manipulation—"rocking" or manual centralization—which can be

common routine with air gages. And the novice can make them instantly. No specialized knowledge, experience nor the trained touch of the surgeon is required. No combination of skilled fingers and a plug gage can equal this precision, though the equivalent accuracy can be gotten of course in time consuming electric "measuring machine" or laboratory instrument manipulation.

However, this brings up another popular misconception among shop

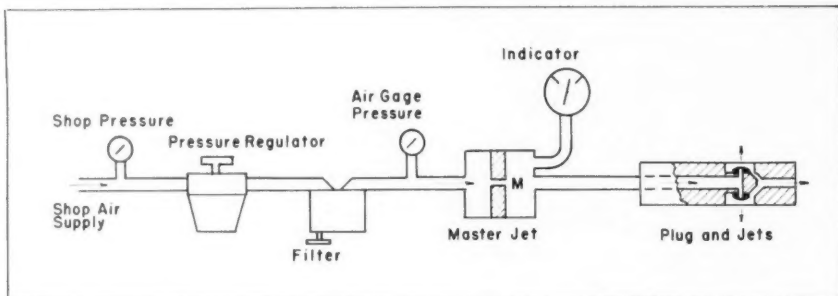


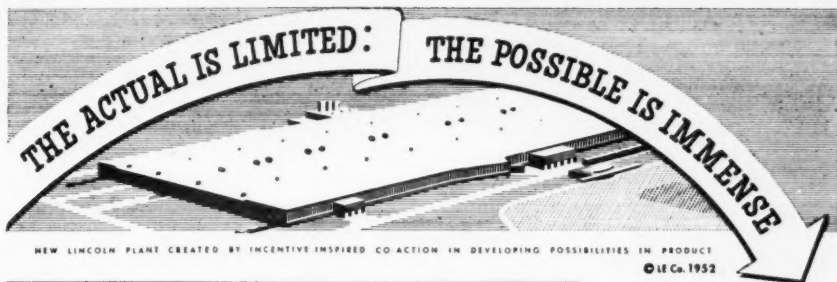
Fig. 1—Diagram illustrating the general broad basis of an air gage system.

somewhat time consuming until the knack is acquired. To an extent, conventional go—no-go plug gages require no special technique in manipulation, other than avoiding the rather common habit of using them as reamers, broaches or sizing tools, but the only message they deliver is whether the hole is oversize, undersize or in tolerance. Not a word about whether it is tapered or oval, barrel or hourglass shape.

With a properly designed, precision made air gage, tolerance variations of 50 millionths of an inch (.00005 in.) are readily detected or measured. Estimates to 10 millionths can be made. Such measurement discrimination is

men concerning air gages. They will admit and appreciate the need and use of air gages on fine tolerance work but they don't realize how satisfactory they can be for so-called rough work with  $\pm$  or  $-$  .005 in. or  $\pm$  or  $-$  .010 in. tolerances. On such work, the conventional plug gage is the ordinary choice and, again, it tells when the work is over or under size and little else.

With an air gage, it's the analysis it delivers which helps the operator no end. The air gage dial discloses taper, out-of-roundness and other boring defects but, best of all, it tells how near he is to size at anytime. The man on the machine can literally watch conformance grow. Whenever any of us



## WELDED STEEL SIMPLIFIES CONSTRUCTION IMPROVES PERFORMANCE, CUTS COST 33%

By **Russell M. Roberts**, Chief Engineer,  
Parks Woodworking Machine Company, Cincinnati, Ohio

Changing over our hand saw frame to welded steel design has simplified many production problems while cutting costs by one third. The original cast construction (Fig. 1) called for machining a complicated casting on which foundry rejections were common. The present welded steel design utilizes simple square tubing, sawed to size, clamped in a plain fixture and butt welded. The efficient use of steel has cut weight by 5% while increasing strength and rigidity.

An added benefit, made possible with welded design, now permits independent leveling of the work table that formerly could be accomplished only through a major adjustment of the frame itself.

**HOW TO DESIGN IN WELDED STEEL**  
Complete training course for designers and production engineers now available for pre-plant. Send for complete details.

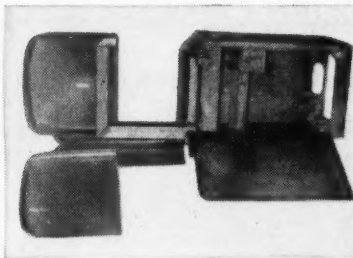


Fig. 4—All Welded Steel Frame for the Parks Woodworking Machine Co., Cincinnati, Ohio. Sides are made formed from 12-gauge metal.

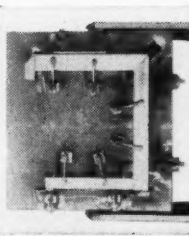


Fig. 3—Simple Jig for welding square steel tubing; components consist of clamps and locating pads.

**PROPER DESIGN  
IN WELDED STEEL  
ALWAYS IMPROVES PRODUCT,  
LOWERS COST**

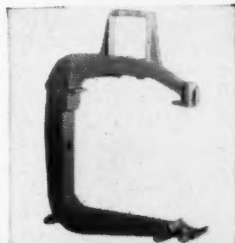


Fig. 1—Original Construction—Machine bracket formerly weighed 56 pounds, was difficult to cast, high cost incurred from excessive rejects.

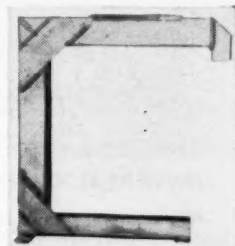


Fig. 2—Welded Steel Design is stronger, more rigid yet weighs only 38 pounds. Weldment costs 33% less than original casting. Eliminates considerable time in machining and assembly.

**HERE'S MORE PROOF**

Machine Design Sheets available on request. Designers and Engineers write on your letterhead to Dept. 254.

**THE LINCOLN ELECTRIC COMPANY**

Cleveland 17, Ohio

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

travel we continually want to know, "How many miles have we gone—how much farther—how fast are we going—and where are we?" The air gage dial offers the operator the same sort of satisfaction he gets from his automobile speedometer. He can see exactly how much metal has been removed, he knows at any time just where he stands. Effortlessly too.

The air gage directs him to adjust his machine sooner, before the work has gone completely out of tolerance, or it tells him to keep traveling. He adjusts settings more intelligently and resharpens tools less often during the day. Because he nags his machine less, he has saved time, energy and tools. When adjustments are called for, the air gage shows him exactly how much. Using conventional fixed gages is at best a cut and try, guess in the dark,

hope it's right this time, method. When a thing is easy to do—neither cumbersome, awkward nor tiresome—it is usually done better.

Suspicion and resistance are usually based on ignorance. Some plant executives have had trouble "putting across" the use of air gages to their associates and supervision perhaps because the underlying principles, the "workings," of air gages have not been too widely or clearly described. For his part, the operator is easier convinced. With an air gage to use for a few minutes, he soon sees the kind of job it does for him, and he is sold. What makes it tick is of little concern. But a little knowledge of why an air gage measures, as well as how, enables the owner to get better service from it.

Without trying to pry into patent secrets and the specialties of each air

## SAVE TIME AND MONEY

### WITH THIS CUTTER GRINDING FIXTURE

#### **RUGGED! RIGID! ACCURATE! LOW-COST UNIVERSAL CUTTER GRINDING FIXTURE**

fits any universal tool or surface grinder. Here's the answer to your cutter and tool grinding problems.

**PRECISION BALL END MILL** grinding is done easily with this flexible and compact instrument, it grinds up to 2 1/4" dia., sets at any angle or radius with any cutting clearance on square, conical or ball nose shaped end mills.

WRITE TODAY FOR DESCRIPTIVE FOLDER No. 602

## ROCHELEAU TOOL AND DIE CO.

650B NORTH MAIN STREET • LEOMINSTER, MASSACHUSETTS



**Berger  
Machine Company**  
mounts inclinable presses on  
**UNISORB**  
**No Bolts • No Lag Screws  
No Holes in Floors**

Prior to moving into their new plant, Berger tested the *modern* way to mount machinery—on UNISORB. A number of inclinable presses of different sizes were chosen for the test. In the standard manner, the feet of the press were cemented to UNISORB pads, which in turn were cemented to the floor. After 6 months of working at top speed on practically a 24 hour a day schedule, the presses were anchored as firmly as ever.

All Berger presses and other machinery are now mounted on UNISORB. The company has noted 75% savings in time and labor installing and repositioning machinery. Couple these savings with reduced wear and tear on machinery and buildings (UNISORB absorbs from 60% to 85% of transmitted vibration and noise) and we think you'll see your way toward important savings for *your* company.

Write today for sample and specifications. Ask for your copy of "Why It Pays To Anchor Your Machines With UNISORB."



LOOK FOR THE RED CENTER.

AND UNISORB BRAND MARK

## THE FELTERS COMPANY

210-L L SOUTH STREET, BOSTON 11, MASSACHUSETTS  
 Offices: New York, Philadelphia, Chicago, Detroit, St. Louis  
 Sales Representatives: San Francisco  
 Mills: Johnson City, New York; Millbury, Mass.; Jackson, Mich.,  
 New York City

gage design and keeping away from tiresomely technical detail, the general broad basis of an air gage system is illustrated diagrammatically in Figure 1.

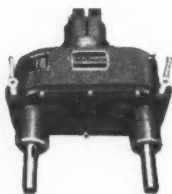
To begin with, an air gage must be supplied with air free from excess water, oil and dirt. Most air gage manufacturers supply filters adequate for the purpose. But once in a blue moon air gages fail in a shop because their compressor seems to pump about ev-

everything but air and the filter gives up in despair.

Air pressure must be regulated within, usually, about 10 per cent of 40 p.s.i. or more. The air gage manufacturer supplies pressure regulators but, again once in a blue moon, he comes across the shop whose air lines creak under pressures greater than 150 p.s.i. or where the house pressure jerks like a model T climbing a hill in high or where a line a mile from the compressor has choked the pressure down to a fleeting impulse.

The regulated air flows through a master jet, an orifice whose area, precisely controlled, is much less than the area of the supply line. The master jet restricts the passage of air and so-called base pressure is built up. This occurs in the chamber effect designated as **M** in Fig. 1. Such pressure acts on the indicating device also connected to the air gage system at **M**. In most makes, the indicator is designed to register a little when proper basic pressure **M** is pres-

## *Yes!* **THRIFTMASTER** *makes ALL TYPES* *of* **DRILLHEADS**



Universal Joint Drillhead . . . Full Ball or Bronze Bearing Construction. Standard and Heavy Duty. From 1/2" Minimum Centers up. Capacities to 1" in Steel.

Gear Driven Eccentric Type Adjustable Drillhead . . . Enclosed, Full Ball Bearing Construction.

Special Fixed Center Drillhead . . . Full Ball Bearing Construction.

- We Stock or Can Build the Right Drillhead for Your Job.
- Write for Complete THRIFTMASTER Catalog or phone for a rush, on-the-spot, quote.



Subsidiary of  
Thomson Industries, Inc.

**THRIFTMASTER** *Products Corporation*

1002 N. Plum St.,  
Lancaster, Pennsylvania

Also Makers of DORMAN AUTOMATIC REVERSE TAPPERS

**GAIN THE**

*Full Benefits of*

**MAGNETIC CHUCKING**

**NEUTROL**

**ELECTRO-MAGNETIC  
CHUCK CONTROLS**

Release and demagnetize work pieces simultaneously. No time lost. No damage to work or to chuck faces. Protect chucks from voltage surges. Speed production.



Manual or Motor Control Models for 50 to 5000 Watts. Chuck area 60 to 7500 Sq. In. Special Models to Suit.



**ELECTRO-MATIC  
RECTIFIERS**

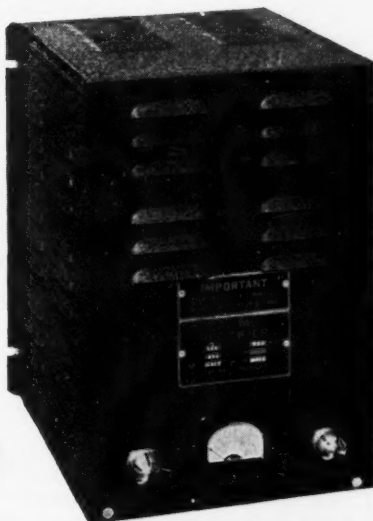
Engineered for dependable power conversion for industrial purposes. Most models equipped with automatic electronic *Time Delay Switch*, adding years to tube life. Quiet and efficient. Fully guaranteed.

*Full Particulars Without Obligation*

**ELECTRO-MATIC PRODUCTS COMPANY**

2235 North Knox Avenue  
CHICAGO 39, ILLINOIS

32  
MODELS  
•  
50 to  
20,000  
Watts



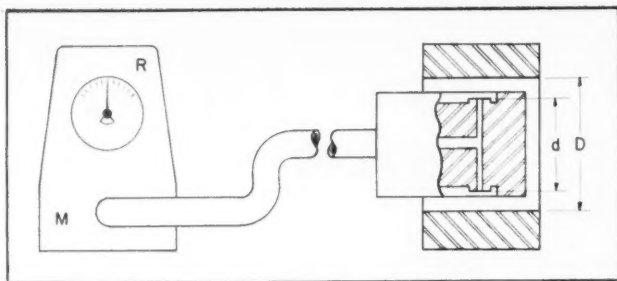


Fig. 2—Cross-sectional view showing detail of plug jet and workpiece.

ent. The air then travels on to the gaging plug.

The action of the plug also appears schematically in Figure 1. Static or base air pressure at **M** is built up a trifle more by the friction of plug and connecting passages and by the I.D.'s of the caliper jets. The air, leaving the plug jets, is deflected, its direction is changed, or it might be said to bounce back off the walls of the workpiece. After the change in direction, the air escapes along the workpiece or out the escape port provided in the plug. This "area of escape"—so-called technically—an area generally established by the jet I.D. and distance between the jet tip and the workpiece wall, is also an effective element in the air gage's operating principle.

Changing the direction of the air at the jets, plus its passage through the escape area, builds up back pressure

which is reflected at **M**, and it is the amount of this extra back pressure produced by the workpiece deflecting the air at the jets which registers as measurement on the indicator dial. The smaller the workpiece—the closer the jets come to the workpiece and the more restricted the escape area—the more sharply the escaping air dodges through and the greater the back pressure registering on the indicator. At first blush it seems unbelievable, but differences in workpiece diameter of half a tenth (.00005 in.) will change the deflection and back pressure enough so the indicator accurately reflects the minute size change.

Now look at Figure 2. The letter **d** represents the plug jet caliper diameter and **D** the workpiece diameter. Let the diameter **D** increase, say, a few millionths at a time and the reading **R** on the meter will vary somewhat similarly. By plotting a succession of expanding or decreasing dimensions

## MILWAUKEE PRECISION EQUIPMENT

Surface Plates, Angles, Parallels, and Straight Edges are all backed by over twenty years of practical experience. You pay no more for this added assurance of accuracy and durability.

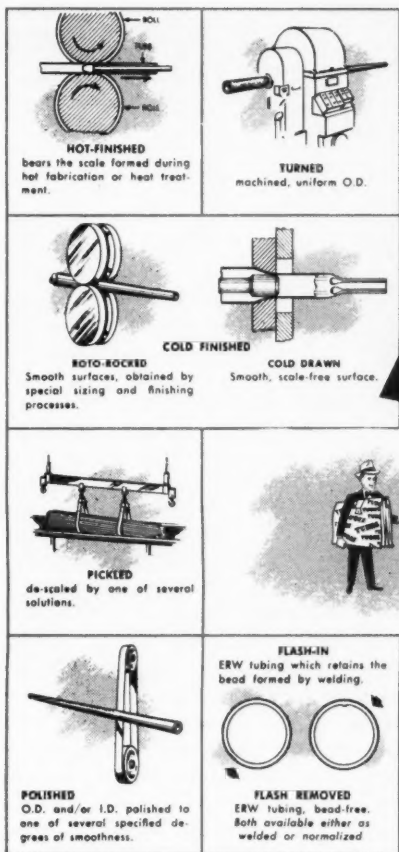
**J. C. BUSCH COMPANY**

*Engineers and Machinists Since 1907*

126 E. Pittsburgh Ave.

Milwaukee 4, Wis.





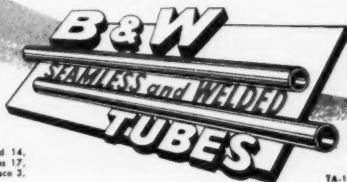
You aren't taking full advantage of the time savings and cost economies in the machining and fabrication of hollow parts from tubing *unless you start with tubing having the PROPER SURFACE FINISH.*

By specifying tubing having a surface finish keyed to your production methods, you take an important step toward reducing the time it takes you to make your finishing operations.

As a specialty tube mill, B&W supplies mechanical tubing in the variety of surface finishes illustrated. Your choice should be influenced by your production facilities and consideration of the cost differentials among the several finishes.

In any case, remember that the tubing *you* can use is more than merely bar stock with a hole in it.

It can be delivered to you as a product ready for you to convert—in the shortest possible time and with least cost—into your finished product. Mr. Tubes—your B&W Tube Representative can help you select the tubing and finish most suitable for your specific end uses.



**THE BABCOCK & WILCOX COMPANY  
TUBULAR PRODUCTS DIVISION**

General Offices & Plants

Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing  
Allentown, Ohio—Welded Carbon Steel Tubing

Sales Offices: Beaver Falls, Pa. • Boston 16, Mass. • Chicago 3, Ill. • Cleveland 14, Ohio • Denver 1, Colo. • Detroit 26, Mich. • Houston 19, Texas • Los Angeles 17, Cal. • New York 16, N. Y. • Philadelphia 2, Pa. • St. Louis 1, Mo. • San Francisco 3, Cal. • Syracuse 2, N. Y. • Toronto, Ontario • Tulsa 3, Okla.

TA-16906

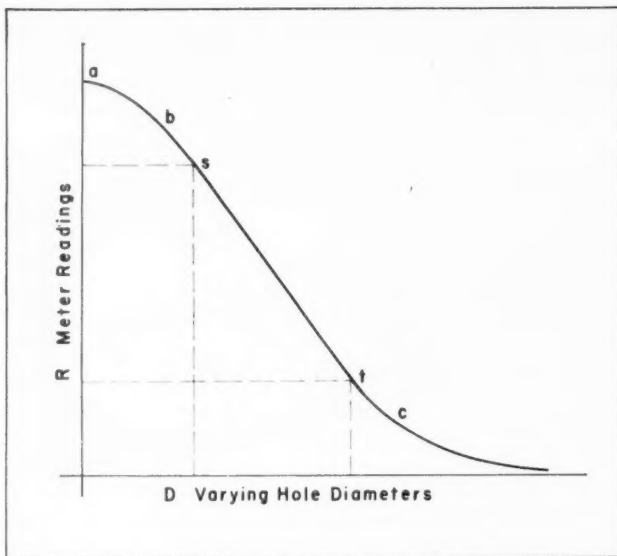


Fig. 3 — Operating characteristic curve obtained by plotting a succession of expanding or decreasing dimensions against dial readings.

curve turns in the other direction, as at *e*, which means the dial readings are not proportional to the increased hole diameters and, consequently, the measurements in this "area" are also not generally accurate.

against dial readings, an operating characteristic curve like that shown in Figure 3 is obtained.

Seal off the plug calipering jets entirely and the dial registers maximum pressure, which would appear on the curve as at *a* in Figure 3. If the I.D. of the workpiece is a little larger, the dial shows less pressure—as for example at *b* in Figure 3—and in successive steps with successively larger I.D.'s, the curve of Figure 3 is completed. With increasing hole diameters, the

The trick then, in air gage design, is to establish a relationship between calipering jet diameter, jet I.D., master jet area, the internal mechanism producing dial readings, and the regulation of air pressure, so that the "straight line" or stable portion of the curve is as long as possible. In earlier designs this stable operating range was .001 in.—.0015 in., seldom as great as .002 inch. If the hole sizes varied much more than .001 in. the air gage could not be depended on. In recent



## Specify FEELER STOCK

For precision fitting, checking clearances, inspection and production work. Available in 12' strips, 1/4" wide, in cellophane, packed 12 pieces of one thickness to a box; also in 25-foot coils. 14 standard thicknesses from .0015" to .015".



### DETROIT STAMPING COMPANY

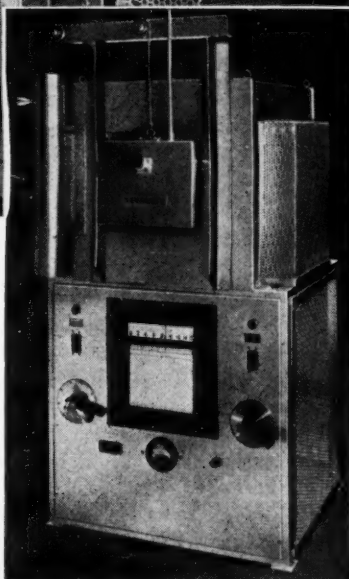
349 MIDLAND AVENUE • DETROIT 3, MICHIGAN



TEMPERATURES TO 2600° F.  
with this **HEVI DUTY**  
G-8156 HIGH TEMPERATURE  
**BOX FURNACE**

*... for heat-treating operations requiring elevated temperatures for research, ceramics, high speed steels.*

The furnace is available in several sizes with or without the control base as shown in the insert. Transformers, pyrometer and circuit breakers can be supplied as required. Write for bulletin HD-741.



**HEVI DUTY ELECTRIC COMPANY**

HEAT TREATING FURNACES **HEVI DUTY** ELECTRIC EXCLUSIVELY

DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS

**MILWAUKEE 1, WISCONSIN**

designs this range has been increased to .003 inch.

A little quick thinking will show that if the areas or I.D.'s of the master jet and/or the caliper jets are changed, say by oil line deposits or dirt clogging them, the built-in balance of the system is thrown off and the gage be-

a "zero setting" valve; the other half flows in parallel to the plug caliper jets. And the dial mechanism, rather than measuring the back pressure of a series system as in Figure 1, bridges the parallel circuits and indicates the difference between base pressure and back pressure.

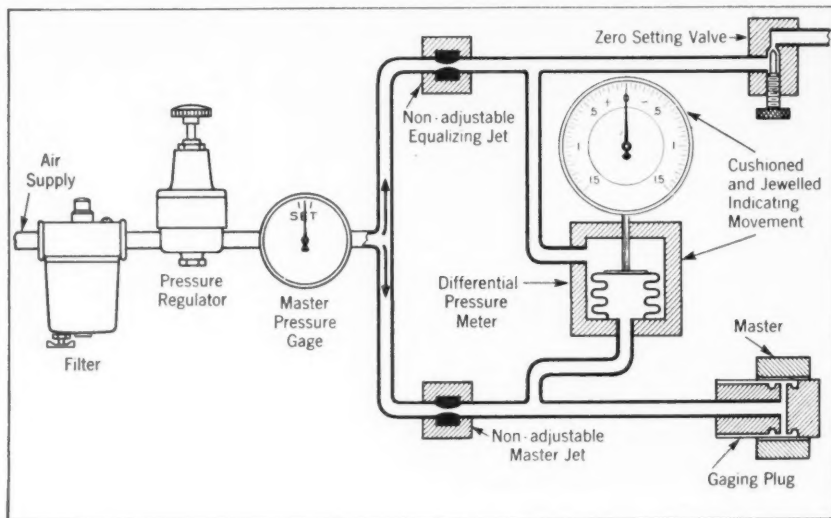


Fig. 4—Diagram showing recently designed air gaging setup which features a parallel system.

comes inaccurate. Furthermore, the correlation of the system depends on even air pressure supplied to all jets or the gage's dependability is likewise disturbed.

The type of design thus far described might be called a "series" system. A recent design, however, features a parallel system. It appears in diagram in Figure 4. Electrical engineers will recognize its resemblance to the famous Wheatstone Bridge circuit.

Here, two circuits are used, in effect, each with a master jet. Part of the main air supply flows to and through

This differential system just about eradicates several of the variables in the old style, series designs. Fluctuations in air pressure supply have very much less effect on it because any variation in line pressure affects the gage's basic or static pressure and the back pressure from the measuring jets simultaneously. Since the indicator registers essentially the **difference** between static and back pressure, it overlooks line pressure variations. In the series system the indicator registers the basic and back pressure and therefore responds proportionately to

# Savings reported by users of **LINCOLN PARK** **CARBIDE GAGES**

**CARBIDE**  
slices initial  
gage costs over  
**\$6,500.00**  
**ANNUALLY**



An eastern manufacturer of ground glass products found replacement costs of worn steel gages to be excessive—gages were expended at a rate of 2,500 per year. At \$3.50 per gage his annual cost for steel gages was \$8,750.00.

Carbide gages were applied to this inspection operation and lasted at least 25 times longer than previous steel gages. After making a complete switch to carbide only 100 gages at \$22.00 each were purchased per year. Thus, carbide gages cost only \$2,200.00 annually and this manufacturer saved \$6,550.00 each and every year on gage replacement costs alone.

#### MANUFACTURERS OF:

CARBIDE, CHROME PLATED AND STEEL GAGES — CARBIDE ROTARY FILES—ALSO,  
FACILITIES AND SKILLED PERSONNEL AVAILABLE FOR PRECISION PARTS PRODUCTION

#### THE PLUS IN PRECISION



*Lincoln Park*

**INDUSTRIES, INC.**

**1719 FERRIS AVENUE, LINCOLN PARK 25, MICH.**

supply line fluctuations.

For the same reason, some minor fouling of the master jets, the zero adjustment and the plug caliper jets from dirty air usually fails to interfere with the accuracy of the instrument. More to the point however, the differential system spreads out the straight

line portion of the curve in Figure 3 or, in practical words, increases the range or measuring spread of the air gage. This happens because, by its very nature, the reliability of the differential system is less affected by the combinations of elements inherent in the series system. In setting up the series design

air gage for use it is necessary to regulate the supply line pressure and the master jet opening to a combination where the base pressure is registered. In shop terms this is called bringing the reading on the dial. Then the equivalent of a workpiece in the form of a master setting ring made to the low tolerance is slipped over the plug jets. The air adjustment manipulations are continued so as to swing the indicator hand to this minimum reading. Another ring made to high tolerance is next put on the plug and the pressure and master jet manipulation continued until the indicator hand registers this time

## NEW MARKING FLEXIBILITY



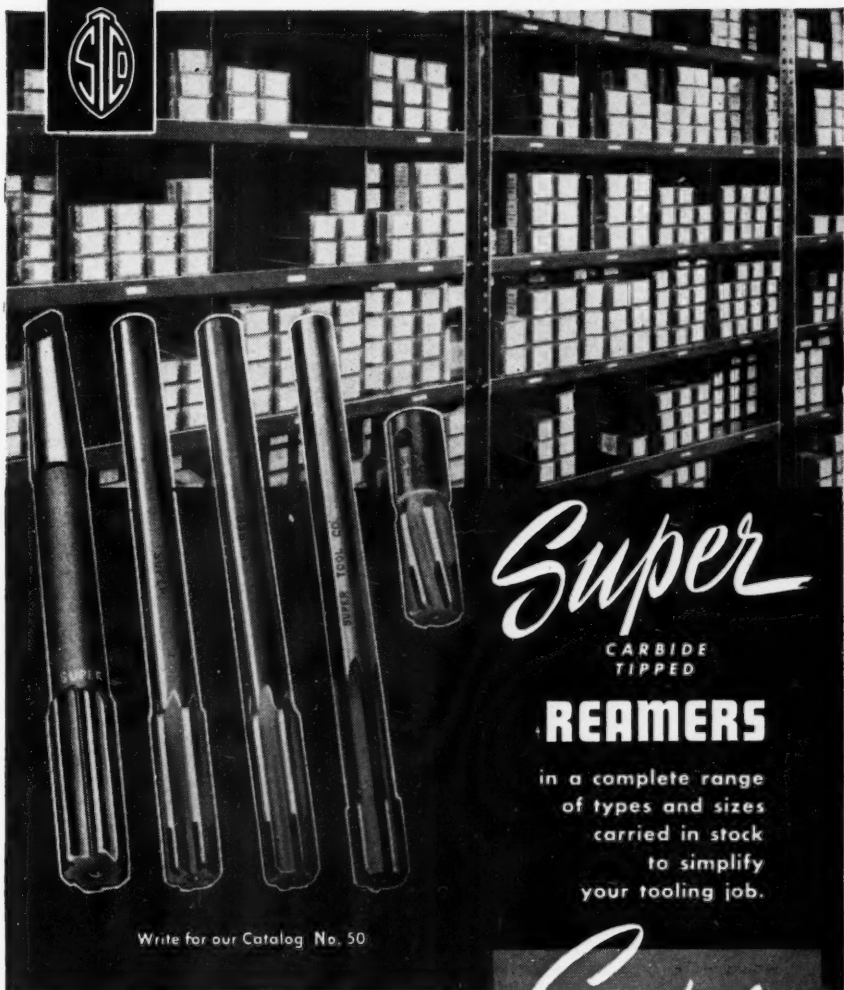
### With PARKER Type Holders and Interchangeable Steel Type Sets

Set hand or press markings quickly, easily to meet each day's changing needs. Parker Type Holders and Steel Type Sets assure new flexibility, making any required stamp available in seconds. Part numbers, dating, inspection numbers—a press or hand marking stamp for any material, any job is always at your fingertips.

Number, and number and letter sets are scientifically compiled to permit the widest versatility, largest number of words. Threaded shank is furnished to allow hand stamp to be made into press stamp in an instant. Each set is crafted with traditional Parker skill to guarantee years of clean, permanent stamping—the convenience and utility of many dies in one economical unit.

Write TODAY for literature and prices on the many dollar saving Parker type sets available.





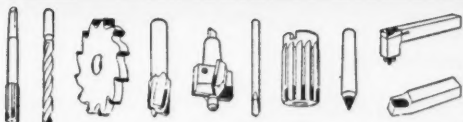
# Super

CARBIDE  
TIPPED

## REAMERS

in a complete range  
of types and sizes  
carried in stock  
to simplify  
your tooling job.

Write for our Catalog No. 50



QUALITY CARBIDE TOOLS

# Super

TOOL COMPANY

21650 Hoover Rd., Detroit 13, Mich. • 5210 San Fernando Rd., Glendale 3, Calif.

against the maximum tolerance marker on the dial. If necessary, the double end adjustment has to be repeated until the dial registers the max and min rings accurately.

The differential type gage, however, requires only one master which is made usually to the mean or nominal blue print size of the work to be measured. With the master on the plug, only the zero adjustment needs to be turned until the dial hand registers on dial

zero. From then on, plus or minus measurements are read directly.

Modern air gage plugs are sized originally to a few tenths smaller than the low I.D. tolerances of the holes to be measured. The calipering jets are recessed into the plug about .0015 in., as indicated in Figure 2. This means to the shop man that the normal use of the plug can be kept up until the diameter of the plug has worn down 0.003 in.—0.0015 in. on a side. The air

gage loses calibration after the hardened tips of the calipering jets commence to make direct contact with the work and begin to wear. Diameter *d*, see Figure 2, is established precisely by the manufacturer so that different size gaging plugs may be interchanged on the gage for different measuring jobs.

In many situations the work is brought to the gage and plug; at other times the air gage is made portable, in effect, because the plug can be taken to the work (in a chuck for instance) if it is connected to the gage through a

**Less Labor—  
More Work—Bigger Profits**

**QUADRILL & QUAD-TAPPER**

**Increase  
Production  
33%**

**Fits  
Directly  
on Drill  
Press**

- Uses up to 4 drills and taper on single press
- Saves moving of jig from one press to another
- Drills to full capacity of press
- Costs less than a drill press — does the work of 4
- A thoroughly PROVEN tool. Thousands in use.

Investigate this important work-saver. Write for literature today.

**CHICAGO-QUADRILL CO.**

1844 BUSSE HIGHWAY, DESPLAINES, ILLINOIS



# INGERSOLL

*Inserted Blade Milling and Boring Tools*

**THE RIGHT CUTTERS  
for Maximum Production**

The cutters illustrated here are only a few of the many types we build.

Whatever your requirements may be, Ingersoll's 65 years of experience as builders and users of machines and cutters is available to you.

We will be glad to have one of our cutter engineers look over your work and make recommendations for increasing your production. Address inquiries to:

**THE INGERSOLL MILLING MACHINE COMPANY**  
2402 Douglas St., Rockford, Ill.

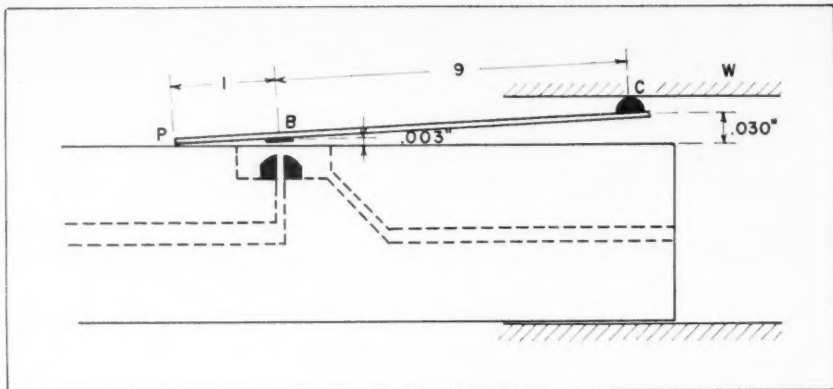
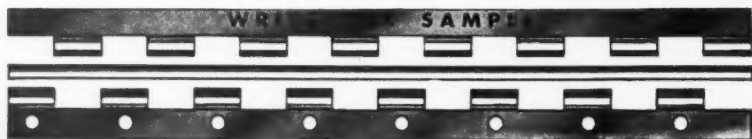


Fig. 5—Drawing illustrating an air gage which is equipped with a contact air plug.

length of flexible plastic air hose. For regular precision work, each plug size covers a work tolerance spread of .003 in.—no more. Generally, plugs and masters are supplied for each particular hole size.

But where work tolerances are more liberal than a .003 in. spread, the air gage can be equipped with what is known as a contact air plug. Its general geometry appears in the diagram of Figure 5. An oversimplified description would mention a reed like device pivoted to the plug (as at P, Figure 5) on whose far end is a spherical contact, C. In between and underneath is a smooth steel pad or boss, B, which

moves just above a single air jet. For the example, let us say the distance between B and C, Figure 5, is nine times the length between P and B. When the contact plug is introduced into the workpiece (W in the diagram) the contact C is depressed and, simultaneously, the pad B moves toward the air jet. With the 10 to 1 lever ratio, the pad P will move only .003 in. when the contact C moves .030 inch. Through methods like this an air gage can be adapted to wide tolerances. However, since the addition of accessories is always liable to introduce slight errors, the contact air gage plug probably should not be expected to provide a



5/8" KNUCKLES, 19, 18 & 16 GA.  
UP TO 3" OPEN WIDTH.  
UP TO 8 FT. LENGTH  
WITH OR WITHOUT HOLES.  
SHIPPED LOOSE OR ASSEMBLED.



**S & S HINGE AND  
METAL PRODUCTS CO.**  
4727 IOWA ST.  
CHICAGO 51, ILLINOIS

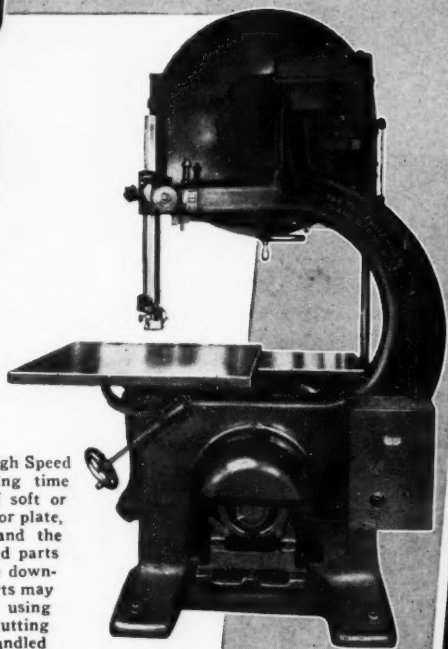


**Cutting Hard-Tempered  
1/8" Chrome Moley Steel**



**Sawing 16" Steel Piling**

## **Greatest Cost Saver in METAL CUTTING**



**F**Riction sawing with Tannewitz High Speed Band Saws results in perfectly amazing time savings in the cutting of flat sheets of soft or hardened steels, non-ferrous metals, armor plate, glass, plastics, many other materials and the trimming of castings. For cutting formed parts there's nothing to compare with it. The down-drag of the saw is so negligible that parts may be trimmed or sawn as desired without using a rest of any kind. Whatever your cutting requirements, chances are they can be handled faster and at less cost with Tannewitz High Speed Band Saws.

**THE TANNEWITZ WORKS  
GRAND RAPIDS, MICHIGAN**

**FRICITION  
SAWING**



**Write for Your  
Free Copy on Friction  
Sawing**

**with  
Tannewitz  
HIGH SPEED BAND SAWS**

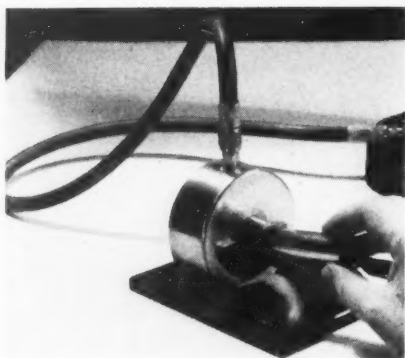


Fig. 6—A ring, with air jets inside, may be hooked to an air gage and cylindrical pieces measured in the manner shown here.

reading closer than .0001 inch.

Mostly because controlling the shapes and sizes of holes makes one of the trickier machining operations, the discussion of air gaging thus far has

been confined to I.D.'s. But the air gage displays about equal facility in the measurement of O.D.'s. A ring, with air jets inside, can be hooked to an air gage and cylindrical pieces measured after the fashion indicated in Figure 6. Such an arrangement is especially effective on the far side of a centerless grinder. For other turning work and cylindrical grinding, air snap gages of the sort illustrated in Figure 7 can be secured. Designs can be concocted too whereby an air gage will register concentricity, taper, angle, width, depth and thickness.

There is growing a sensible tendency in some shops to more or less automatically equip each lathe, grinder or automatic with its own air gage. Then when a new job is to be tooled up, the required air gage plugs, rings, snaps or special forms are secured in about

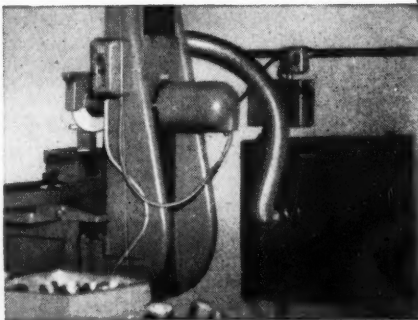
# STOP DUSTS *Instantly* with DUSTKOP

Available from stock of  
22 standard models

300 cfm to 10,000 cfm

**for:** Surface Grinders, Tool and Cutter Grinders; Polishers and Buffers; Abrasive Belts and Discs; Woodworking and Plastic Industry Equipment . . . DUSTKOPS collect almost all kinds of industrial dusts.

Ask for Catalog 605-2. Describe dust problem for recommendation by return mail—no obligation.



**AGET-DETROIT CO.**

207 Main St. Ann Arbor, Mich.

# **BIG SWING- MEDIUM WEIGHT**

**a revolutionary  
new Drilling Machine**

**Sibley E-25**

Not too light, not too heavy—weighing 765 lbs., this 25" swing drill machine has the required speed and power for high volume production. Accuracy of large table with coolant trough is maintained to .0007" in six inch radius. The variable speed drive permits selection of the exact speed for any size drill from 1/8" to 1". Convenient speed control is self-locking with no belts to change. Tachometer permits accurate reading of speeds. Powered with a 1-1/2 H.P. Axial Air Gap Motor. 5 spindle speed options.



## **SIBLEY**

**MACHINE & FOUNDRY CORP.  
87 EAST TUTT STREET  
SOUTH BEND 23, INDIANA**

**SIBLEY MACHINE & FOUNDRY CORP.  
37 E. Tutt St., South Bend 23, Indiana  
Send Catalog No. 69, Free!**

Name \_\_\_\_\_ Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

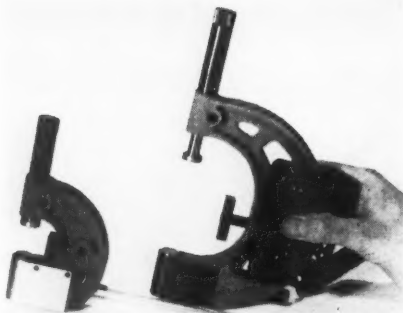


Fig. 7—Air snap gages of the type shown here are designed for use in turning operations, cylindrical grinding, and so on.

the same frame of mind the necessary wheels, form tools, cutters, reamers, and so on, are supplied and charged to the job.

To complete the story on air gages, a couple more potential and typical misconceptions perhaps should be

cleared up. The shop man occasionally runs smack into these conditions and he is bewildered because air gage publicity and air gage salesmen are inclined to slide over them. Every once in a while there is a situation where the hole in a piece shows on the air gage at the minimum tolerance diameter. If someone then tries the hole with the same minimum tolerance size, conventional plug gage or tries to assemble a minimum size mating shaft in the hole, he runs into what seems to be interference.

The difficulty is surface finish. Likening the spiral score marks of surface roughness to screw threads, the air gage in effect measures the **pitch** line of the V's while the conventional plug or the mating shaft measures the **minor** diameter. An air gage is a comparator. It is mastered usually with a

## LEIMAN AIR PUMPS give you Greater Capacity!



• Compare this cross-section of a Leiman Air Pump with any other rotary pump. It is working air space that counts — and Leiman provides 2 to 3 times more area, per size and weight of pump.

What's your air application? Send us details. Leiman engineers offer over 60 years' experience on thousands of air applications.

**CATALOG AND APPLICATION DATA SENT ON REQUEST.**

For Pumps—write DEPT. A.

**LEIMAN BROS., INC., 168 Christie St., Newark 5, N. J.**

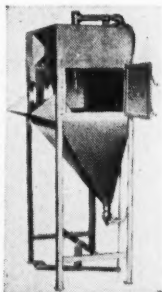
**H**ANDLE your pressure, vacuum or suction jobs with much smaller Leiman Air Pumps. Save weight and space — run at lower r.p.m. — have fewer moving parts—no springs, gaskets or packing—no tips to renew—nothing to give trouble.

**Metal Cleaning and Finishing without acids or scratch brushes**

### LEIMAN SANDBLASTS

Fast, low - cost, safe, uniform way to clean scaly, rusty, rough surfaces—prepare for plating and finishing — stencil letters and designs — more rapid matte or satin finishes. Use unskilled help. For Sandblasts—

write DEPT. B



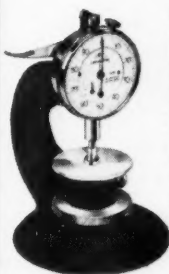
# FOR *Strictly* IMPERSONAL INSPECTION CHOOSE **AMES** DIAL COMPARATORS

Ames Dial Comparators make the inspection of duplicate parts an extremely simple, rapid and accurate operation. Ames Comparators are strictly impersonal in their accuracy — the results being in no way dependent on the skill or judgment of the operator. The pressure of the gauging members against the work is mechanically determined and therefore uniform.

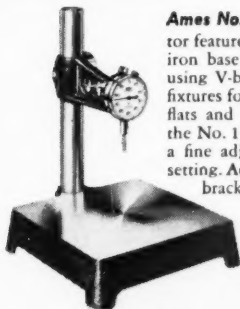
Check the Ames Dial Comparators shown — one of them may solve a Quality Control problem for you.



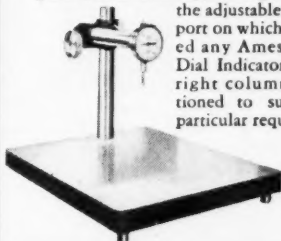
**Ames No. 1** Dial Comparator is an easily adjustable bench model that measures objects up to 2" in cross section. The table bracket may be quickly located and locked in position on the column. The table itself may be further positioned and locked for final fine adjustment. This comparator is designated *Ames No. 1W* when equipped with dead-weight contact pressure and contact area to ASTM specifications for measuring resilient materials.



**Ames No. 2** Dial Comparator is a compact, stable bench model for measuring non-yielding materials — sheet metal, glass, hard rubber. The 2" diameter table is adjustable to bring pointer to zero. *Ames No. 2W* is similar to the Ames No. 2, but is furnished with dead-weight contact pressure and contact areas to ASTM specifications for checking textiles, plastics, sheet rubber, etc.



**Ames No. 13** Dial Comparator features flat-ground, cast-iron base of ample size for using V-blocks and locating fixtures for checking rounds, flats and odd shapes. Also, the No. 13 can be fitted with a fine adjustment for close setting. Accurately adjustable bracket holds any Ames Micrometer Dial Indicator.



**Ames No. 130** Dial Comparator is designed especially for inspecting comparatively large parts. For this reason, the flat-ground steel base, the adjustable indicator support on which can be mounted any Ames Micrometer Dial Indicator, and the upright column are proportioned to suit the user's particular requirements.

*Send us your Quality Control job specifications, and we will supply complete details and proposal without obligation.*

Representatives in  
principal cities.

**B. C. AMES CO.** 29 Ames Street  
Waltham 54, Mass.

Mfr. of Micrometer Dial Gauges • Micrometer Dial Indicators

carefully lapped, precision master whose surface roughness is nil. Hence the discrepancy implied above. The air gage starts to be inaccurate in this manner when the surface finish of the work varies from the surface finish of the master by 50 microinches—a 100 microinch difference is about the limit that can be tolerated.

Where the work will be rougher, a calculation might be made that will estimate the dimensional difference between the "pitch diameter" and the "minor diameter" of surface roughness, and the minimum tolerance marker on the air gage dial can be changed to accommodate the trouble. Occasionally too, the gage is deliber-

ately mastered with a workpiece, say, or a special master, whose surface condition corresponds closely with that of the work to be measured.

A close cousin of the situation just described sometimes pops into view in the form of coolant, grease or cutting oil. By and large, the air pressure at the plug jets will blow oil and coolant off the work piece enough so that the gage reads the true metal to metal dimension. Sometimes, however, a sticky grease or coolant appears which does not automatically clean off. Then the air gage shows the size of the artificially smaller, grease coated hole, and



*Made to your Order...*  
**FULLER**  
*Cutting Tools*

SPECIAL, HIGH-PRECISION  
 HIGH-SPEED STEEL & CARBIDE TIPPED

**FULLER TOOL CO.**

4000 WEST ELEVEN MILE RD.

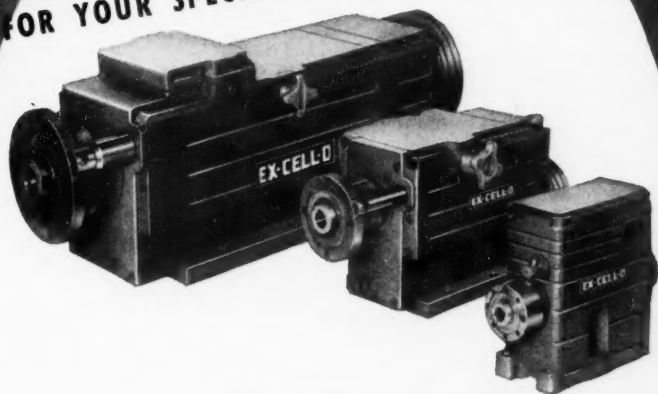
BERKLEY, MICH.

LINCOLN 2-5600



# EX-CELL-O Hydraulic Power Units

FOR YOUR SPECIAL PURPOSE MACHINES



Ex-Cell-O Hydraulic Power Units provide a compact, flexible source of power for feeding, rotating and retracting cutting tools. They are especially suitable for automatic drilling, reaming and counter-boring, using a single tool held directly in the spindle nose, or using two or more tools in a multiple spindle head. Three standard units are available—styles 28-A, 21 and 20, shown above. For full information send for Bulletin 45361.



**EX-CELL-O CORPORATION**  
DETROIT 32, MICHIGAN

as a result, may allow oversize work to travel through.

Such a potential condition can be checked, of course, by measuring an oil coated workpiece, then cleaning it carefully and measuring it again to see if the air gage registers a difference. Another stunt frequently tried is to run the master setting ring itself under the coolant or oil and to master the gage with it thus normally coated like a workpiece. For unequivocal accuracy nothing quite equals clean masters and workpieces however.

As a general rule, coolant, oil and dirt on workpieces do not foul air plug jets. Nevertheless it pays to examine the jets from time to time; obviously they are not supposed to collect garbage. If the operator is as thoughtful of the cleanliness of an air gage plug as he is of his micrometer, for instance, he is usually playing safe enough. One check on fouled jets is to notice that when the air plug is mastered, its dial hand fails to zero the way it did when the job started. Another symptom is the way the dial hand will waver as if it were undecided where to land when the gage is checked with the master.

About the most effective way, peculiarly, to foul and plug up the jets is to rub a sweaty thumb over them. There is something about sweat, dirt and loose particles of skin forming a plas-

tic cork which forty pounds of air will not dislodge. Peculiarly too, the motion of rubbing his thumb over a jet is about the first thing a man will do, unconsciously, when you hand him an air gage plug to examine. For dirty jets, give them a bath in carbon tet and if necessary use the equivalent of a hardwood toothpick. Never prod jets with a wire or metal.

All in all, however, the air gage is proving to be about the most trouble free, foolproof measuring apparatus to appear in recent years. Other types may be trouble free, but not at the same time precise, accurate, reliable or speedy. Probably no other instrument can be used by the operator so successfully with so little instruction, coaching or apprenticeship.



# SUPEREAM

## REAMERS IN *Decimal* SIZES

▼ FROM .032 all the way up—Blanks can be ground to your exacting specifications and delivered in approximately 10 days. By purchasing SUPEREAM REAMERS in steps of .001 you SAVE—Time, Labor and Money in the cost of extra machining and lapping. SUPEREAM REAMERS all have ground and polished flutes and are held within .0002 tolerance.

REAMERS are also furnished in Right-hand spiral, right-hand cut, as well as Left-hand spiral, right-hand cut.

• In Emergency phone  
Libertyville 2-4200



Write for descriptive literature and prices.

**TWENTIETH CENTURY  
MANUFACTURING CO.**

Route 176 and Bradley Rd., Libertyville, Ill.



# Mark Twain!

## Mississippi Pilots Use Marking Devices

Samuel Clemens adopted his pen name from the expression used by Mississippi River Pilots, such as he, indicating the 2 Fathom Marking Device affixed to their lead lines.



### SOLID ROLL DIE

Assuring the utmost in accuracy—used in marking machines, lathes and screw machines.



### PUNCH PRESS DIE

Faithfully reproduces and is particularly adapted to large production marking.



### ROLL TYPE HOLDER

Depending on requirements, can be had for either solid or interchangeable type.

## CADILLAC MARKING DEVICES

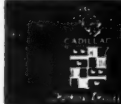
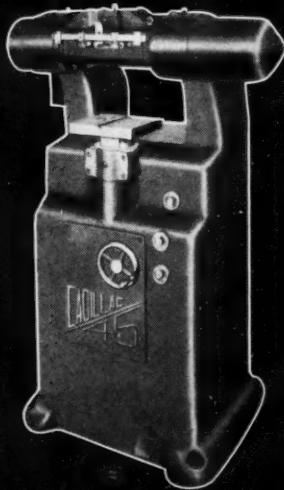
are Designed for

### ALL MARKING PURPOSES

Whatever your requirements, from small Hand Stamps to Pneumatic, Hydraulic or especially created Marking Machinery, CADILLAC STAMP COMPANY stands ready to supply or design and build to meet your needs.

### CADILLAC 45 HYDRAULIC MARKING MACHINES

Compact, self-contained, manifold mounted. One control gives full range of marking depth. It will mark round, flat and irregular surfaces. Machine capacity is up to 110 one inch impressions per minute.



## CADILLAC STAMP CO.

17319 RYAN ROAD • DETROIT 12, MICH.  
3000 IRVING PARK • CHICAGO 18, ILLINOIS

## modern equipment at work

### Sentry Furnaces Afford Jarvis Increased Production

**T**HE Charles L. Jarvis Company, toolmaker with headquarters in Middletown, Conn., and a new branch plant in North Attleboro, Mass., has been continually stepping up requirements for heat-treated high speed steel. According to Jarvis officials, both the Middletown and North Attleboro plants are obtaining increased production of heat-treated parts

through the use of industrial electric furnaces built by The Sentry Co., Foxboro, Mass., and the unique Sentry Diamond Block method of hardening metals. Two Model 2Y Furnaces in the North Attleboro plant, for instance, are regularly turning out over 5,000 blanks per hour, a rate considered extremely high by Jarvis.

In addition to the demand for more speed in heat treating, Jarvis has set rigid uniformity specifications which, it is claimed, are being fully met by

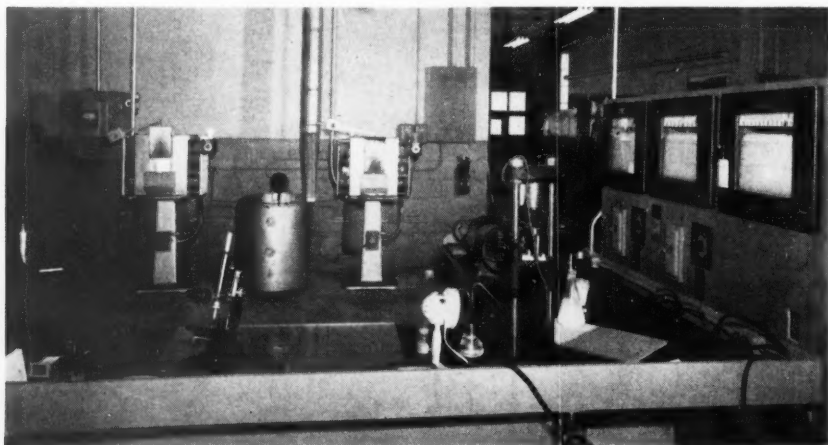


Illustration showing two Sentry Model 2Y Furnaces installed in The Charles L. Jarvis Company's North Attleboro plant

means of the heat-treating equipment which is presently employed by the company.

## Machining Aluminum Motor Housings for Abrasive Cut-Off Machines

**B**EAVER Machine & Tool Co., Inc., Syracuse, N. Y., recently completed the job of machining aluminum motor housings (of the design shown in Fig. 1) for the Stone Machinery Co., Manlius, N. Y., manufacturer of swing abrasive cut-off machines. The housings protect the motor and electrical circuits of the 3½ h.p. Model M-14, as shown in Fig. 2, which is capable of cutting ferrous and non-ferrous solids up to 2 inches and pipe and structurals up to 2½ inches.

Each housing required six separate

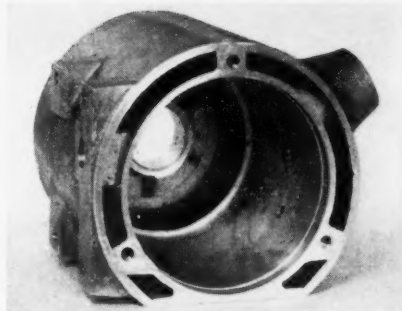


Fig. 1—Completely machined aluminum motor housing for swing abrasive cut-off machine shown in Fig. 2

machining steps—boring, facing, reaming, milling, drilling, and tapping—and, in order to complete these operations, individual fixtures were designed to hold the housings to chucks. A Bullard 36-inch vertical turret lathe was used to bore and ream the interior

## Finished PIPE NOTCHING IN 5 SECONDS OR LESS

ARC-FIT actually notches out pipe or tube ends in less than 5 seconds to give you snug-fitting "T" or angle joints, ready for welding or brazing, without deformation or any extra finishing.

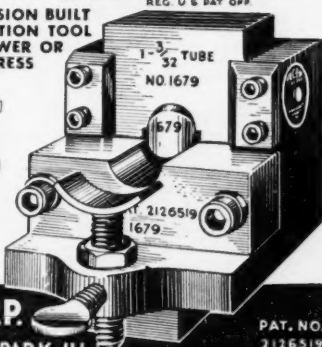
**Standard ARC-FITS** for "T" joints using single size standard pipe from ¾" to 2" shipped promptly from stock.

**Special ARC-FITS** for larger sizes or angular cuts supplied to your specifications . . . Quick-interchangeable punches and dies also available. Send us drawing of joint and material specifications for quotation and full information.

ARC-FIT IS PRICED SO THAT EVEN THE SMALLEST SHOP CAN AFFORD IT

Ask for descriptive Bulletin MMS.

A PRECISION BUILT  
PRODUCTION TOOL  
FOR POWER OR  
HAND PRESS



PAT. NO.  
2126519

**Vogel TOOL & DIE CORP.**  
1823 N. 32nd AVE., MELROSE PARK, ILL.

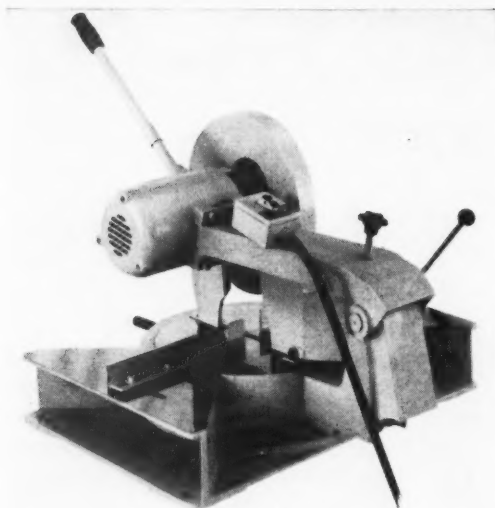


Fig. 2—Stone Model M-14 Abrasive Cut-Off Machine on which aluminum motor housing of the design shown in Fig. 1 is used

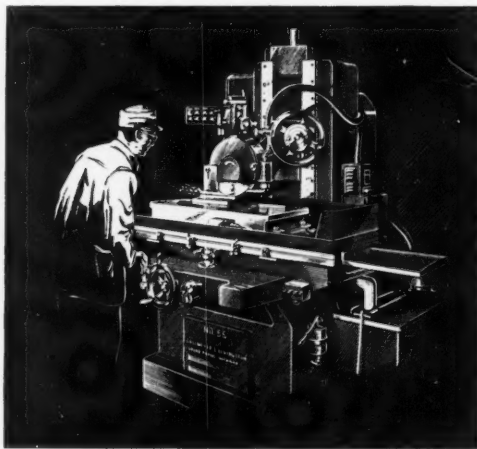
motor field (5.504-502 to 5.429-426 inch diameter bore) and to form a step

around the wall of the interior field  $6\frac{1}{16}$  inches from the front of the unit. This same machine was also used to bore the armature aperture to within a tolerance allowance of plus or minus 0.002 inch and to finish the top and face the opposite side to height. The housing base and back were milled with a Kemp-smith milling machine. Final operations involved the precision drilling and tapping of 13 holes on an Edlund drill press.

## ABSOLUTE TOLERANCE CONTROL

When job specifications leave no leeway, when extreme tolerances must be rigidly maintained . . . that's when the built-in precision of Grand Rapids Grinders proves most valuable.

Defense commitments are delaying rapid fulfillment of your orders . . . but as always we're doing our best to serve you.



## GRAND RAPIDS GRINDERS

*...the very best*

GALLMEYER & LIVINGSTON CO., 308 Straight Ave., Grand Rapids, Mich.  
Manufacturers of  
Surface Grinders • Cutter and Tool Grinders • Tap and Drill Grinders



WHEN THE  
GOING IS  
TOUGH...



CLE-FORGE  
HIGH SPEED DRILLS  
will give you  
more holes per grind...



*Telephone Your Industrial Supply Distributor*



THE **CLEVELAND** TWIST DRILL CO.  
1242 East 49th Street • Cleveland 14, Ohio

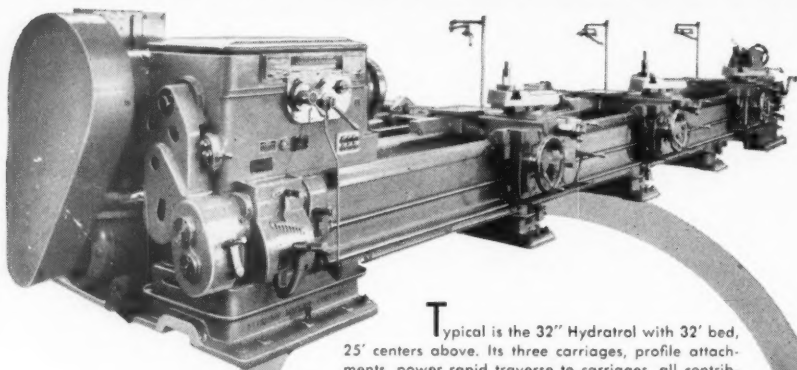
Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 2 • San Francisco 5  
Los Angeles 58 • E. P. Barrus, Ltd., London W. 3, England



# Hydratrol Lathes

*Again Helping Uncle Sam to Lower Costs and Increase Production!*

## LEHMANN'S VERSATILITY OF DESIGN *Machines Gun Tubes Better and Faster*



Typical is the 32" Hydratrol with 32' bed, 25' centers above. Its three carriages, profile attachments, power rapid traverse to carriages, all contribute to doing the rough and finish turning of the O. D. on gun tubes better and faster.

### CHECK THESE STANDARD FEATURES

#### Six Sizes

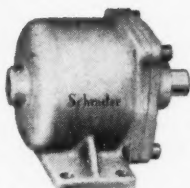
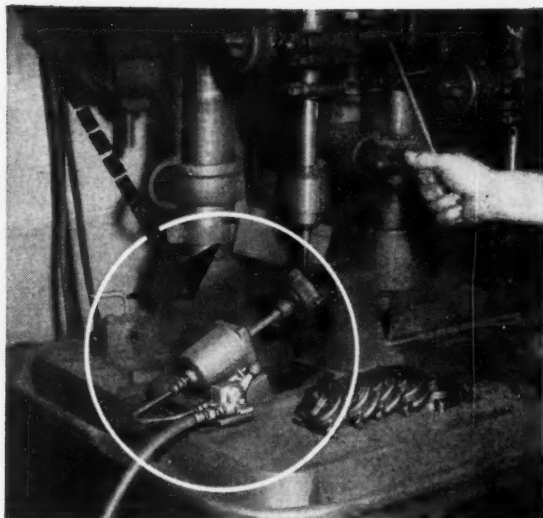
Medium Duty 16"-18"  
Heavy Duty 20"-25"  
Heavy Duty 32"-36"  
Heavy Duty 40"-50"

- ▶ Hydraulically operated speed changes.
- ▶ Simplicity in construction, simplicity and safety in operation.
- ▶ Automatic Slide Rule indicates spindle speeds, operation numbers, cutting speed.
- ▶ Self-compensating hydraulic friction clutches and brakes.
- ▶ Speed changes through positive clutches, gears remaining in constant mesh.
- ▶ Spindle release for chucking.
- ▶ Perfect, safety control lubrication with filtered oil.

**Lehmann**  
MACHINE COMPANY

CHOUTEAU AT GRAND • ST. LOUIS 3, MO.

# Simplify any work-holding problem



ClampAir Cylinder

## Schrader

REG. U. S. PAT. OFF.

Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets • Blow Guns • Air Line Couplers • Air Hose & Fittings • Hose Reels • Pressure Regulators & Oilers • Air Strainers • Hydraulic Gauges • Uniflare Tube Fittings

Watch a worker making ready for a simple drilling operation. You'll find he takes as much as ten seconds just to grip the work tightly.

You can eliminate most of this lost time with the new Schrader ClampAir. What's more, the ClampAir takes no more effort than opening a valve.

The ClampAir is actually a bantam cylinder, with power to hold work firmly—with the same force every time. That means the end of rejects caused by inconsistent forces.

It's easy to find out how ClampAir can shorten production time, increase worker efficiency. Write, outlining the applications in which you are interested—or fill out the coupon below.

products

control the air

Mail This Coupon Today

### A. SCHRADER'S SON

Division of Scovill Manufacturing Company, Incorporated  
461 Vanderbilt Avenue, Brooklyn 17, N. Y., Dept G-5

I am interested in more information on.....

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

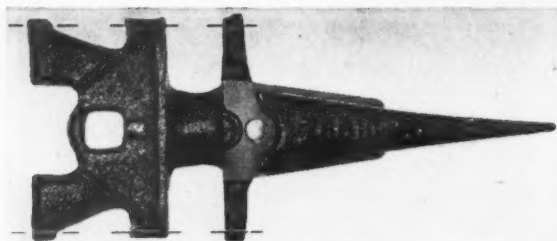


Fig. 1—View of a cast steel mower blade guard, with dotted lines indicating surfaces that are trimmed in a shearing die with Carboloy Grade 55A tungsten carbide inserts

## Carbide Shearing Die Inserts Trim Six Surfaces on Steel Casting

**T**HE successful use of shear blocks of Carboloy cemented carbide for the trimming of flash from steel castings in production has been reported by the Oliver Corp., Shelbyville, Ill. The shear blades are used on a progressive die in a crank press in which mower blade guards of the design shown in Fig. 1 are respectively pier-

ed, riveted, and trimmed (as indicated by dotted lines).

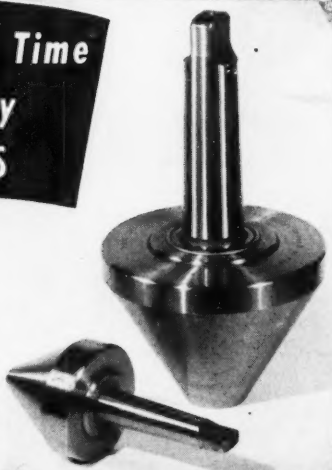
The shear die originally had two steel trim blocks, one on each side of the die, to simultaneously shear six faces varying in length from  $\frac{1}{4}$  to  $\frac{5}{8}$  inch and located three on each side of an S.A.E. 1045 casting. The tool life of the trim blocks, relative to the other tools in the progressive die, was comparatively short, and the blocks had to be changed at the end of each day (12,000 pieces). The use of Carboloy cemented carbide made by the Carboloy Department of General Electric

## PERFECT ALIGNMENT Every Time with ROOFE Heavy-Duty BULL NOSE CENTERS

- Two double rows of quality bearings in the large and small ends of the nose of this live center are your assurance of perfect alignment on any type of work.

Two shank sizes provide diameters from  $\frac{1}{2}$ " to  $7\frac{1}{2}$ " for a wide range of work with a single center.

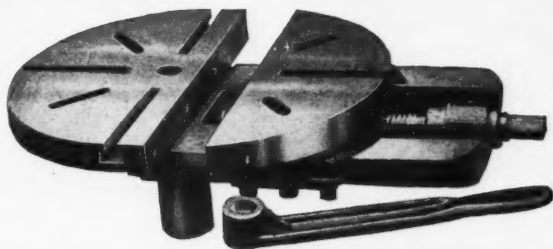
**Write now for complete catalog of all types of ROOFE Live Centers**



## HOUSTON GRINDING & MFG., CO., Inc.

2110 QUITMAN STREET • HOUSTON 10, TEXAS  
Reliable Distributors Wanted

# Try the MODERN SAFETY DRILL TABLE



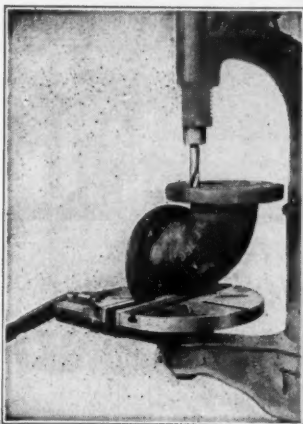
*Under Our*  
**FREE  
TRIAL  
OFFER**

*For Faster, SAFER Work  
in Your Maintenance Department*

Combines a drill table, a vise, a set of parallels and V block. No more lost fingers, from hand held jobs that slip. No more 30 minutes set-ups for a 1 minute drilling operation. Made in 6 sizes, from 8" to 28" dia. We guarantee each Safety Drill Table will save its cost on labor alone in 6 months, to say nothing of plant down time when vital maintenance is delayed even a few minutes.

#### **WRITE FOR FREE FOLDER**

Shows many typical set-ups, and use on radial drills. Complete specifications on all models. Covers MONEY BACK GUARANTEE and 30 DAY FREE TRIAL OFFER.



**MODERN MACHINE TOOL CO.**  
*Jackson, Michigan*

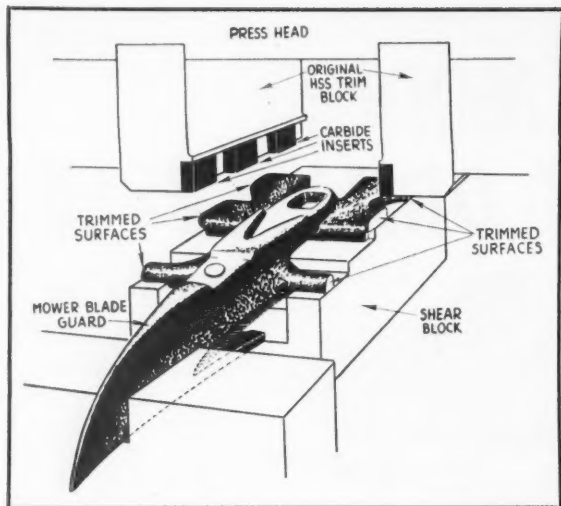


Fig. 2 — Line drawing of steel casting in shearing position in die, showing the carbide inserts that are brazed in steps in the original steel trim blocks

The original trim blocks were altered to receive the inserts by grinding a step in each, as shown in Fig. 2, and the inserts, of Carbology Grade 55 A tungsten carbide, were then brazed on the steps at intervals along each block to correspond with the casting faces to be sheared. The impact of the die is taken

Co., Detroit 32, Mich., on the cutting edges of the trim blocks proved to be the answer to the problem.

on the  $\frac{1}{4}$ -inch face of the inserts, and, since the parts are not stripped, there is a  $\frac{1}{64}$ -inch overhang of the

# Chicago

**MOUNTED**

# Wheels

... now  
even better with

## 79E BOND



**the new miracle  
grinding wheel bond**

Greatest selection of sizes and shapes for every application. Best of all, deliveries are good . . . ready when you need them.

Try Chicago Mounted Wheels—bonded with 79E Bond—and you'll never buy any other! This tough new grinding wheel bond, exclusive with Chicago Wheel, has taken the industrial world virtually by storm, doing a better grinding job faster.

**CHICAGO WHEEL & Mfg. Co.**  
Dept. MMS, 1101 West Monroe Street, Chicago 7

QUALITY PERFORMANCE AT LOW COST

# WITH PRECISION MADE **ROYAL** TOOLS

Good workmanship and fast, economical production depend on good tools. Royal Tools pay off from the very first moment you use them in

your shop or plant production line. Compare performance and costs and you will specify 100% guaranteed Royal Tools.



EMPIRE LIVE CENTERS

Morse tapered 1 to 7; Jarno, B, & S, str. shanks, specials in various sizes.

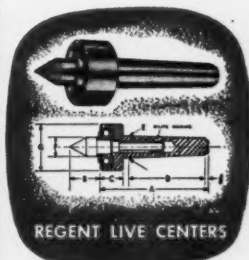
Six interchangeable points • Tapered seat • Very short overhang • Pre-loaded heavy duty bearings • Hardened and ground tool steel points • Accuracy of  $\pm .0001$  • Available in toolmaker's case



REGAL LIVE CENTERS

Sizes 1 to 5 M. T.

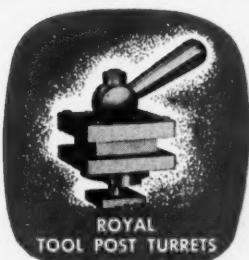
Three interchangeable points • Replaceable parts and bearings • Hardened and ground points • Precision combination bearings • Positive bearing seal • Sturdy, medium duty tool • Handles large variety of lathe, grinding and milling jobs



REGENT LIVE CENTERS

Sizes 1, 2 and 3 M. T.

Small diameter head • Shorter overhang • Accurate to .0001 • Free-turning point revolves with smallest parts where point of average live center will not turn • Minimum deflection due to rigid, one-piece point • Oilite bearing and ball bearing



ROYAL TOOL POST TURRETS

2 1/2", 3 1/2", and 4 1/2" square

Twelve positions • Re-indexes to closest measurements • All working parts hardened • Simplifies and cuts set-up time • Achieves greater productivity and accuracy • Fully protected against dirt and chips • Fits all lathes



ROYAL COLLETS

Spring Type: Finest, select steels • Property heat treated and precision ground • Hard jaws • Styles 3C, 3AT, 5C, and 6AT.

Step Type: 3" in diameter • Machineable for multiple steps or desired diameters • Holds work firmly • Styles 3C, 3AT, and 5C.



ROYAL DRAW BARS

Complete with Collet Sleeve Precision-built and engineered hand-wheel type • Extremely accurate • Sturdy construction, finest quality workmanship and materials • Polished maple handle • Hollow torque tube extends through spindle • 1/2" capacity for all popular lathes

**Write today for detailed catalog sheets and price list.**



**ROYAL**

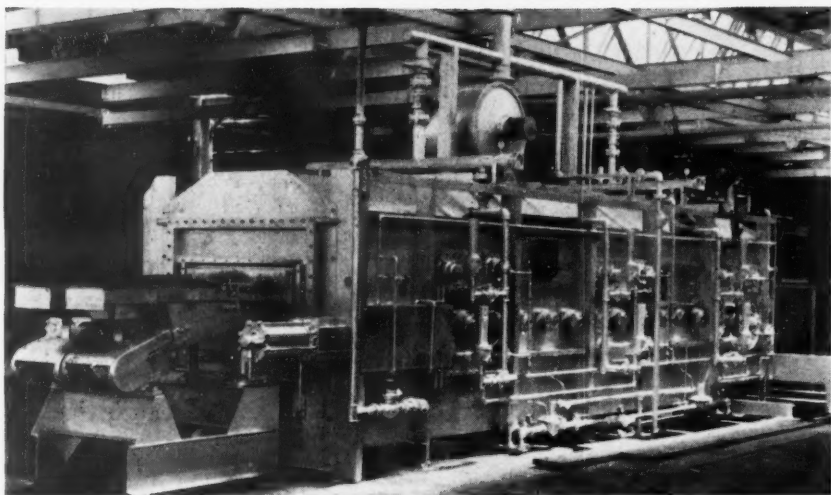


Fig. 1—View of radiant tube belt furnace for carbon restoration installed in plant of large cap screw and bolt manufacturer

carbide to provide free clearance to facilitate removing the part before the die head moves back to the top of its stroke. With the carbide blocks, tool life of the shearing die is said to have been increased to well over 100,000 pieces between grinds, with very little grinding needed at the time of sharpening and no sign of the cutting edges being chipped or broken under the continuous impacts encountered during operation.

## Carbon Restoration of Screw Stock Results in Production Economies

ONE of the world's largest manufacturers of cap screws and bolts restores surface carbon on screw stock during controlled atmosphere hardening in the cast alloy belt furnace shown in Fig. 1, product of Surface Combustion Corp., Toledo 1, Ohio. The easily controllable atmosphere is produced

## LUERS

### PATENTED CUTTING OFF TOOL HOLDERS PATENTED CUTTING OFF BLADES

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

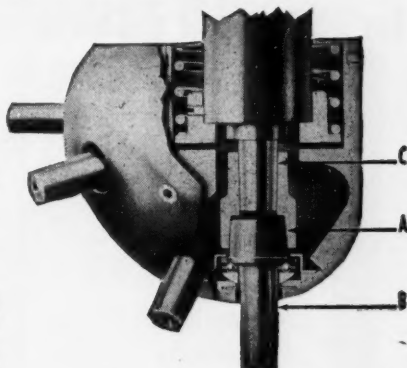
Manufactured by

**J. MILTON LUERS, 12 Pine Street, Mt. Clemens, Mich.**

Produced under License Issued by John Milton Luers Patents Inc.

# MORE HOLES PER HOUR — PER DOLLAR

Increase production of any standard drilling machine by adding a Lign-o-matic, the only drill turret with the patented, self-centering principle that guarantees sustained accuracy equal to the drilling machine itself.



## FOR ALL CONSECUTIVE DRILL PRESS OPERATIONS

### PROVED PRODUCTION INCREASE

— Turret indexes faster than tools can be changed or work moved to another spindle. A single Lign-o-matic will release 5 drilling machines for other work and still show increased production and reduced costs on original job.

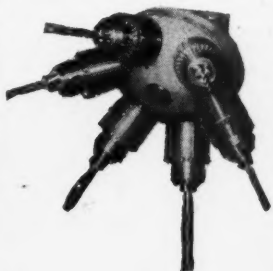
**VERSATILITY**—Fits any standard drilling machine without altering the machine. Handles operations such as drilling, reaming, counterboring, and tapping (on reversible spindle machines), up to 1/2" diameter in any material.

**PRECISION**—Patented, self-centering tapered drive (A) automatically locks turret spindle (B) into exact alignment with drilling machine spindle (C) for sustained accuracy.

**GUARANTEE**—May be returned in 10 days for any reason for full refund of purchase price. Two-year guarantee against defective parts.

**PRICE**—Model D, 6 spindles with No. 2 Jacobs male taper ..... \$235.00  
Chucks extra at established prices.

**DELIVERY**—Currently, 2 weeks.



☐ Please rush ..... Lign-o-matic turrets for  
(drill press make)..... (size).....  
(quill dia.)..... (spindle taper).....  
My name.....  
Title.....  
☐ Please send literature on Lign-o-matic turret.  
(Attach coupon to company letterhead)

**HOWE & FANT, INC.**  
527 FLAXHILL RD., SO. NORWALK, CONN.

# GAMMONS

## TAPER REAMERS

for all types of die work



- Specially treated for modern die steels.
- Rapid cutting capacity.
- Large range of standard sizes.
- Tapers per inch: .005, .008, .013.

Write for  
data sheets.

**GAMMONS • HOAGLUND CO.**  
MANCHESTER 2, CONN.  
Manufacturers of helical taper pin, chucking,  
die makers and special reamers.

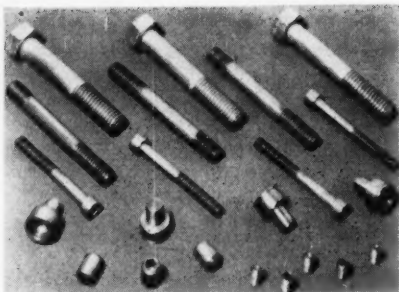
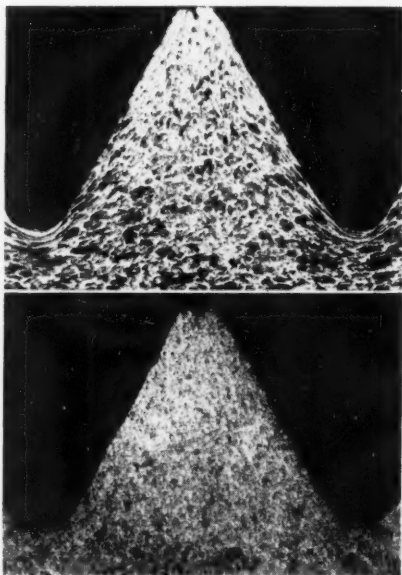


Fig. 2—Some of the bolts and fasteners treated in the furnace shown in Fig. 1

in an RX prepared atmosphere generator. Furnace atmosphere carbon potential is controlled by regulation of dew point, at the generator, to match analysis of steel being treated. Carbon on 0.35 carbon steel stock depleted to

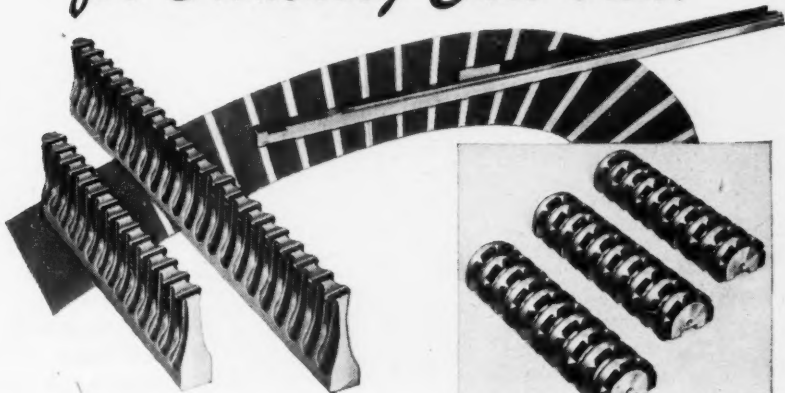
Fig. 3—(Above) Micrograph of  $\frac{1}{8}$  inch-18 rolled thread cap screw before carbon restoration. (Below) Micrograph of  $\frac{1}{8}$  inch-18 rolled thread cap screw after carbon restoration



Specialists in Designing and Producing Carbide Cutting Tools

# **WESSON** CARBIDE TIPPED BROACHES

*for Broaching Cast Iron!*



- LESS DOWN-TIME
- MORE PIECES PER GRIND
- FINER FINISHES



CARBIDE tipped broaches are new but Wessonmetal cemented carbide and Wesson Carbide tools are designed and produced with the combined skills of top metallurgists and specialists in carbide cutting tool fabrication. Broaching with Wessonmetal will mean less down-time, more pieces per grind, smooth cutting through scale, sand loaded areas and hard spots.

GET A QUOTATION ON WESSON CARBIDE TIPPED BROACHES FOR YOUR JOB TODAY. WRITE DIRECT OR ASK YOUR WESSON REPRESENTATIVE.

**WESSON COMPANY** *Affiliated with*  
**WESSON METAL CORPORATION**

1220 WOODWARD HEIGHTS BLVD

• FERNDAL (DETROIT 20), MICH

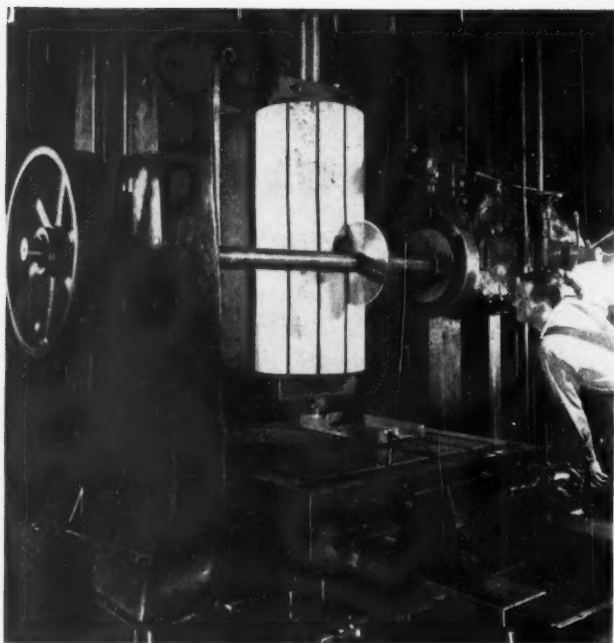


Illustration showing how a carbide-tipped saw installed on a boring mill is used to cut slots in a large cast iron rotor, reducing machining time from 75 hours per slot with the previously used planer and carbide-tipped goosenecked tool set-up to 2½ hours for all ten slots in the work

depths of 0.006 to 0.007 inch has been uniformly restored with the furnace.

Since screws and bolts (Fig. 2) hardened in this atmosphere are free of decarburization (Fig. 3), they can be economically threaded by rolling instead of machining.

### Metal Core-Slotting Time Greatly Reduced with Carbide-Tipped Saw

**T**HE accompanying illustration shows a Woodsman carbide-tipped metal slitting saw manufactured by North American Products Co., 3100 W. Cherry St., Milwaukee, Wis., as used for slotting operations on a cast iron rotor. In this particular case, 10 slots were required in the 2,000-lb. al-

loy iron rotor, the slots to be 5¾ inches deep x 52 inches long x 0.140 inch wide (plus or minus 0.002 inch). The rotor was also to be cut with the same number of slots having a 0.437-inch width, plus or minus

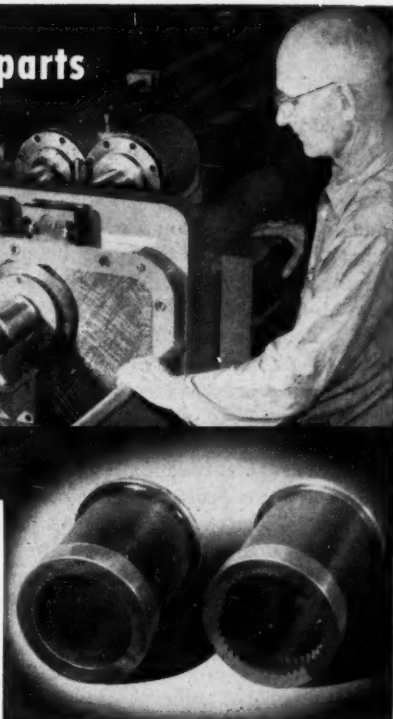
0.002 inch. The rotor holds fins which slide in the slots.

In order to maintain the extreme tolerances required on the rotor, the job was previously performed on a planer with a carbide-tipped goosenecked tool. Seventy-five hours per slot were required in order to obtain the finish and size desired. Smoothness of the slot walls was essential since the rotor blades were actuated by centrifugal force and had contact with the rotor housing only. After many discouraging delays because of frequent tool resharpening and inspection of the slots, the firm manufacturing the rotor decided to switch to the Woodsman carbide-tipped metal saw, which was used on a boring mill, completing all 10 slots in 2½ hours, including set-up time.

# 8 separate propeller parts broached on 1 machine

A PROPELLER MANUFACTURER GOT THESE BENEFITS  
FROM HIS AMERICAN HORIZONTAL MACHINE:

1. Tooling is readily inter-changeable for eight separate parts of short run production.
2. Large parts are easily loaded and unloaded.
3. Double helical drive for right and left hand helix readily adaptable to machine.
4. The horizontal machine provided the most tonnage and stroke per dollar invested.



To broach the propeller sleeve gears, American built and equipped a standard HDE-30-72 horizontal broaching machine with six interchangeable lead bars for different internal spline operations. The machine broaches eight different propeller sleeve gears.

Number of spline teeth vary from 43 to 55 with diameters ranging from  $2\frac{3}{4}$ " to  $3\frac{1}{2}$ ", and with length of splines cut ranging from  $\frac{3}{4}$ " to 3" long. Ask American which type of machine best suits your requirements. Just send a part print and hourly requirements for our recommendations.



**American** BROACH & MACHINE CO.  
A DIVISION OF SUNSTRAND MACHINE TOOL CO.  
ANN ARBOR, MICHIGAN

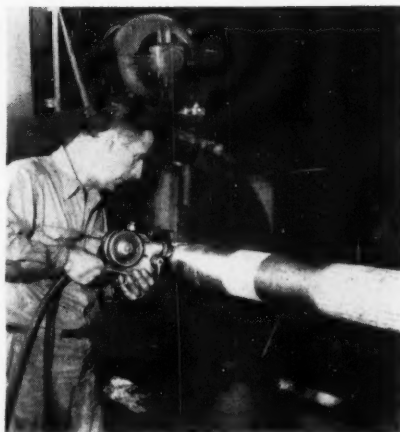
See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery



## Monel Tugboat Shaft Salvaged by Metallizing

**T**HE 14-foot long x 6¼-inch diameter solid Monel shaft shown being sprayed with stainless steel is used on a tugboat in service around New York harbor. The shaft had become badly worn at the stern packing, causing serious leakage. With nickel in critical supply, at least two to three months would be required for delivery of a new Monel shaft stock and an additional week to machine it, at a cost between \$1200.00 and \$1400.00. However, even this high cost would be far overshadowed by the loss of many thousands of dollars of rental revenue over a two to three-month period.

To solve this problem, the worn portion of the shaft at the stern packing area was turned down in a lathe to 6½ inches in diameter and prepared



Operator is shown spraying a worn Monel tugboat shaft with stainless steel to restore it to useful life.

with a special roughening tool. Next, about 8 lb. of stainless steel was sprayed on the shaft to bring the di-



from 18 to 24 pieces per hour.  
Let us show you how!

## BARKER

(Two-Jaw or Three-Jaw)

## WRENCHLESS CHUCK

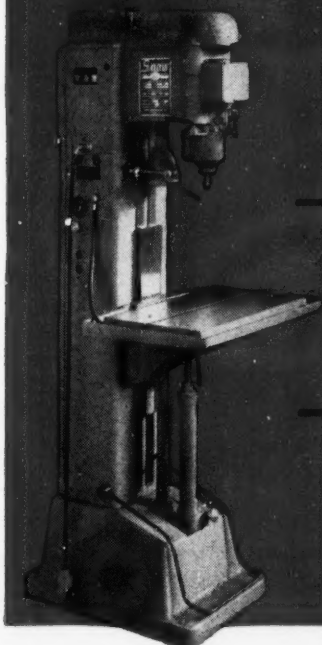
will pay for itself in 60 to 90 days on production schedules by giving MORE parts per hour at a LOWER cost per part. Most round parts can be set in the Barker Wrenchless Chuck without stopping the machine. It saves time, helps speed up production, and cuts spoilage where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine. The Barker Chuck shown here, replacing an ordinary 3-jaw chuck, jumped production hour. It can do it in your plant too.

Write for bulletin 201 today



*Chuck Division*  
**THOMAS HOIST CO.**  
28 S. HOYNE CHICAGO 12

*For Top  
Production*



# SNOW

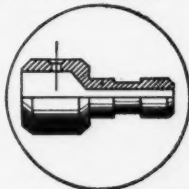
## FULL UNIVERSAL MACHINES

Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

### DRILLING

Crossdrill and C" T" Sink 1/16" Hole

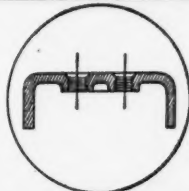
Material—Brass  
Production—4800 per hour  
Fixture—#15 Vertical index  
Equipment—#1-UD Drilling  
Machine



### TAPPING

Tap Two #10-32 Holes

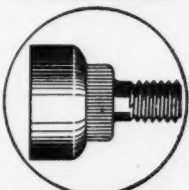
Material—Steel stamping  
Production—3800 tapped holes  
per hour  
Fixture—#14 horizontal index  
Equipment—#1-UT tapping  
machine



### THREADING

3/8"—24 Thread—1/2" Long

Material—Die Cast Aluminum  
Production—2500 per hour  
Fixture—#10 Drum dial  
Equipment—#3-TR Threading  
machine



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production. Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

# SNOW

**MANUFACTURING COMPANY**  
435 Eastern Ave., Bellwood, Illinois  
(Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

**Submit Sample Parts for Production & Cost Estimates**

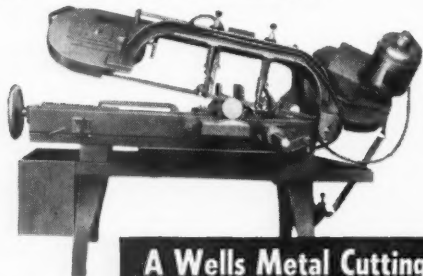
ameter up to 6 $\frac{5}{16}$  inches, and the shaft was then turned to the required 6 $\frac{1}{4}$ -inch diameter. The total time required for the entire operation was eight hours, and the tugboat was back in service in two days. The metallized stainless steel coating on the Monel shaft was actually found to extend the life of the shaft due to the improved lubricating characteristics of the sprayed metal.

## R.C.A. Assembly Problem Solved with "Junior" Powrarm and Custom-Built Fixture

**A**CCORDING to the Wilton Tool Mfg. Co., 925-941 Wrightwood Ave., Chicago 14, Ill., the use of a Wilton "Junior" Powrarm combined with a special mobile fixture designed by a Wilton distributor and his customer

has solved a difficult assembly problem. The Southwest Supply Co., Glendale, Calif., the Wilton distributor, and the R.C.A. plant in Los Angeles (formerly the Houston Corporation) needed a special fixture to hold rectangular parts ranging in size from 2 x 3 to 18 inches and cylindrical parts from 6 x 14 inches in diameter, weighing from  $\frac{1}{2}$  to 12 lb. Since several sides of the parts had to be accessible to the assembly operators, the problem was particularly suited for the Wilton Powrarm Positioner, which actually provides an assembly operator with a "third

## Are You Wasting Dollars Trying to Save Pennies On Cut-Off Jobs?



Wells No. 8 with wet cutting system.

**A Wells Metal Cutting Band Saw pays for itself in savings**

IT'S easy to fool yourself about costs on your cut-off jobs. Perhaps you say, "It doesn't amount to much, why worry about how we do it." You'd be surprised. Look at what a Wells Saw gives you—Modest first cost with a model for every budget . . . Rugged, heavy duty construction for minimum cost per year . . . Fast, continuous band saw cut-

ting . . . Accurate cutting to minimize subsequent machining . . . Simple operation that requires no special skill.

To cut your cut-off costs, ask your Wells Distributor for further information or write direct.

Standard Wells Saws: No. 49A—3 $\frac{1}{2}$ " x 6 $\frac{1}{4}$ "; No. 5—5" x 10"; No. 8—8" x 16"; No. 12—12" x 16". Wet cutting systems available for Nos. 5, 8 and 12. Automatic bar feed available for Nos. 8 and 12. Special machines for capacities to 48" x 48".

*Products by Wells are Practical*

**METAL CUTTING BAND SAWS**

WELLS MANUFACTURING CORPORATION  
808 TYLER ST. • THREE RIVERS, MICH.



# Buckeye

BRONZESMITHS

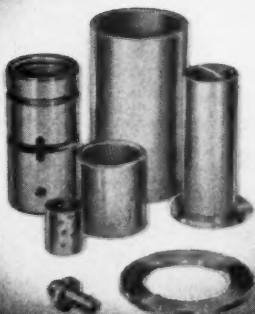
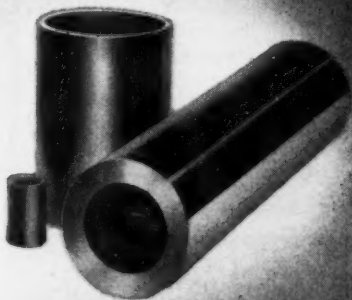


SINCE 1900

## R<sub>x</sub> FOR CUTTING COSTS

**"The Lowest Cost Bronze  
Bearings Are Those That Can  
GO THE DISTANCE!"**

**For Stock Bearings  
and Maintenance Bars  
SEE YOUR NEAREST  
BUCKEYE DISTRIBUTOR!**



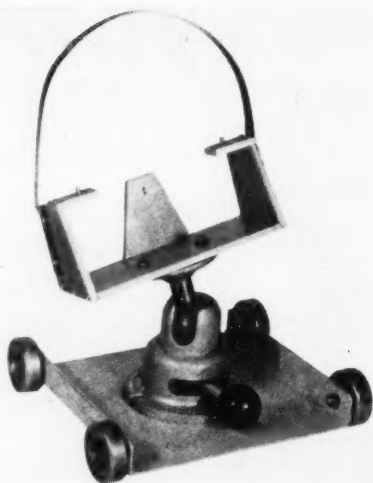
### FOR SPECIALS

**For Bearings to your  
specifications, write direct  
to The Buckeye Brass and  
Manufacturing Company,  
6410 Hawthorne Avenue  
Cleveland 3, Ohio**

**BARS • BEARINGS • BUSHINGS**

arm" as it holds work, positions it and locks it at any angle desired. In this manner, all sides of the work are easily and quickly available to the assembly operator.

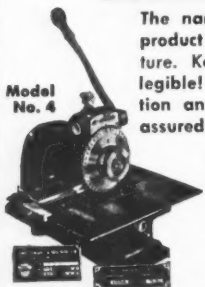
Mobility was required since all parts had to be moved from one assembly operator to another independently. An appropriate fixture was designed which, in conjunction with the Powr-arm, was mounted on a dolly equipped



Dolly with Wilton "Junior" Powrarm and custom-built fixture used in R.C.A. Los Angeles plant to solve difficult assembly problem

## SHARP

### NAMEPLATE MARKING

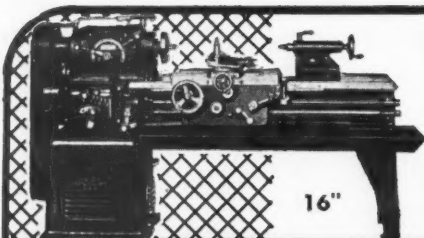


The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

#### NAMEPLATE DETAIL PRESS.

- Simple Operation
- Perfect Alignment
- Uniform Depth

**GEO. T. SCHMIDT, INC.**  
 1806 W. BELLE PLAINE AVE.  
 CHICAGO • 13 • ILLINOIS



### CARROLL AND JAMIESON LATHES

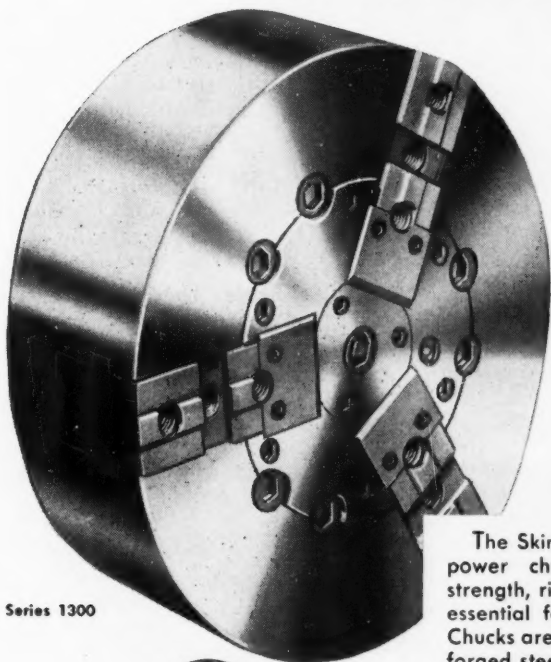
- This 16" lathe is equipped with 12 speed geared head, motor drive, and Timken mounted spindle. It's modern in design — with liberal dimensions.

Write today for descriptive bulletin.

**THE CARROLL & JAMIESON MACHINE TOOL CO.** BATAVIA, OHIO, U.S.A.

**SKINNER  
CHUCKS  
HAVE**

**POWER  
TO PUSH PRODUCTION!**



Series 1300



THE CREST OF QUALITY

**THE  
SKINNER  
CHUCK CO.**

**340 Church Street, New Britain  
Connecticut**

*Write for catalog giving complete details on the Skinner line of power and manually operated chucks. And ask about new movie "Chucks and Their Uses" — available for free showings.*

The Skinner line of power chucks and power chucking equipment has the strength, rigidity and design features so essential for today's production needs. Chucks are available from 6" to 21" with forged steel bodies, and with either 2 or 3 adjustable or non-adjustable jaws. Exclusive sliding wedge construction grips internal or external work positively regardless of jaw position. The chuck will not release the work, even if air line is broken, until operator actuates the draw bar. Skinner double acting rotating and non-rotating air cylinders are available for all sizes of Skinner power chucks, and for actuating all types of holding fixtures and tailstocks. Other Skinner accessories include hand operating valves — complete air unit including regulating valve, pressure gage and lubricator — filters — soft blank top jaws; draw bars — draw tubes, etc.

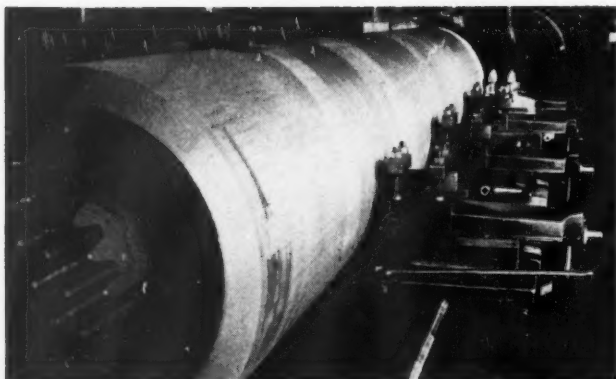


Fig. 1 — Illustration showing 14-ton cast iron drier roll 60 inches in diameter x 226 inches long being rough turned in one pass with four 1-inch diameter heavy duty Kendex insert tools

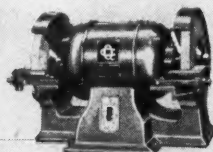
## Turning Time for Cast Iron Drier Rolls Reduced by Use of Carbide Tooling

**A**N 83 per cent reduction in turning time together with the elimination of much tool regrinding previously required has been experienced at an east-

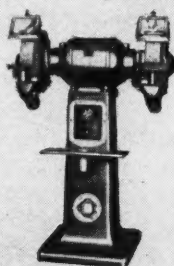
ern paper processing equipment producer's plant by the use of Kendex tungsten carbide insert tools for machining cast iron drier rolls of 60-inch diameter, 226-inch length, and 3-inch wall thickness, as shown in Fig. 1. These huge 14-ton rolls are supported by spiders on each end of a 14-inch diameter shaft and machined on a Niles engine lathe which has been in operation approximately 50 years. Pri-

**OK  
for**

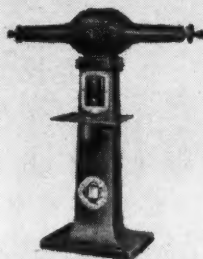
- durability
- freedom from downtime
- low cost



**BENCH GRINDERS**



**FLOOR GRINDERS**



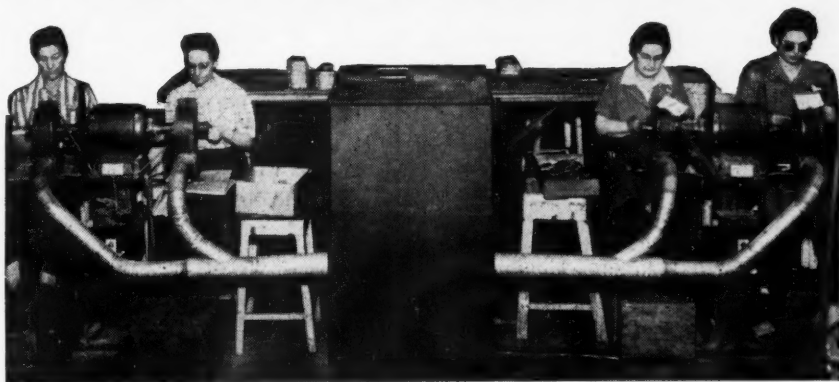
**HEAVY DUTY BUFFERS**

## QUEEN CITY grinders & buffers

Compare QUEEN CITY Grinders and Buffers with others costing much more . . . you'll find, as have hundreds of famous plants . . . they give extra value in long life, low maintenance and first cost. All the quality features . . . ball bearings, heavy duty motors, etc. . . in a complete range of sizes and models. Get the facts. Write for prices and complete details.

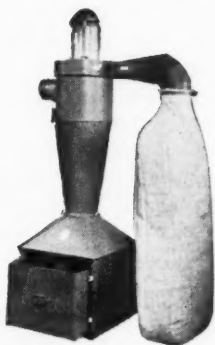
**QUEEN CITY MACHINE TOOL CO.**  
233 E. 2nd St. Cincinnati 2, Ohio

## A TORIT DUST COLLECTOR ...



### at Four to One Still Your Best Bet!

#### TORIT FB TYPE Dust Separator



Torit also manufactures a line of cyclone type dust separators. Sizes up to 5 H.P., with or without after-filters.

Here four grinding wheels are in constant use finishing small parts, yet this 1½ H.P. Model 81 Torit Dust Collector completely eliminates any abrasive dust hazard to operators or to finished parts.

The efficient, self-contained design of Torit Dust Collectors permits compact set ups like this. There is no work interference, piping is minimized, and operating costs are low because this Torit Dust Collector runs only when the wheels are in operation.

Solve *your* dust problems with Torit Dust Collectors. Models and sizes for standard and special dust-collecting problems. Ask for details and the latest Torit catalog.

# TORIT

## MANUFACTURING CO.

296 Walnut St.

St. Paul 2, Minn.

or to the use of carbide tooling, turning was performed with four high speed steel tools at 14 s.f.m.,  $\frac{1}{8}$ -inch feed per revolution, and  $\frac{1}{16}$ -inch maximum depth of cut. Rapid edge wear on the tools caused a taper to be produced on the work, thus necessitating an additional cut for its removal. The total turning time was 16.8 hours.

Four Kendex insert tools, produced by Kennametal, Inc., Latrobe, Pa., are now being used on this job, complet-

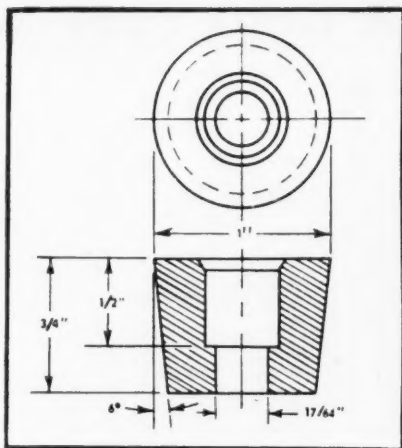


Fig. 2—Sketch of heavy duty Kendex insert

ing the turning operation in one pass with each tool cutting about 56 inches of the total length. The feed and depth of cut remain the same as previously used; however, the speed has been increased to 41 s.f.m. (maximum due to condition of machine). The turning time with these carbide tools is now only 2.9 hours. The Kendex inserts (see Fig. 2) are rotated to a new cutting edge after turning each drier roll. Approximately nine new cutting edges are available per insert before regrinding is required. Since insert life is about 17 regrinds, approximately 153 rolls may be turned per set of inserts.

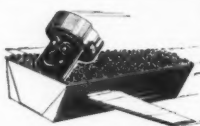
## Larger Stocks- Faster Service-

MORE REASONS TO  
SPECIFY ACE



**ACE DRILL  
BUSHING  
CO., INC**

5407 Fountain Ave.  
Los Angeles 29



Want to be sure? Then, specify ACE Drill Bushings. Our large, controlled inventory means we can often meet your special needs from our stock shelves. Delivery is fast. And you are sure of the finest drill bushing on the market—ACE. Get the whole story in our new catalog. Order your free copy today.

Ask for Catalog  
1101- 8

## NO MORE COSTLY JIGS

on small production jobs with  
**TROYKE WORM WHEEL OPERATED TABLES**

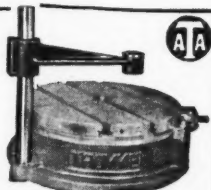


Sizes:

9 - 12 - 15 - 18 - 21 - 25

See your dealer or write for Catalog No. 17, fully illustrated, showing all models and applications to various work.

**Troyke Mfg. Co.,**



Drilling attachments can now be furnished for Worm Wheel Operated Tables.

**Cincinnati 9, Ohio, U.S.A.**

# LARGEST SELLING CUTTERS FOR TOUGH DIE STEELS!



This T-J Cutter at work on a connecting-rod die block for a board drop hammer. A cutter of right design and heat treatment for this high speed work in tough die steels, making possible maximum efficiency of these machines.

Specify **T-J**  
FOR MORE WORK BETWEEN GRINDS!

In die and forge shops everywhere . . . T-J Die Sinking Milling Cutters are today's top favorites . . . because they're "tops" in performance!

You can raise the feed . . . they're *extra sturdy* for cutting tough die steels! Designed for speed, accuracy and long life . . . T-J Cutters hold a sharp edge longer on job after job . . . less breakage! Made from an extremely high grade steel . . . properly machined . . . scientifically heat-treated and accurately ground. Wide range of styles and sizes . . . *right* to increase the output of your machines and *reduce costs*! Send for new catalog 150. The Tomkins-Johnson Co., Jackson, Mich.

FOR TOUGH JOBS SPECIFY



**TOMKINS-JOHNSON**  
DIE SINKING MILLING CUTTERS

## ideas from readers

### Emergency Boring and Tapping Fixture for Job Work

By JOHN E. HYLER

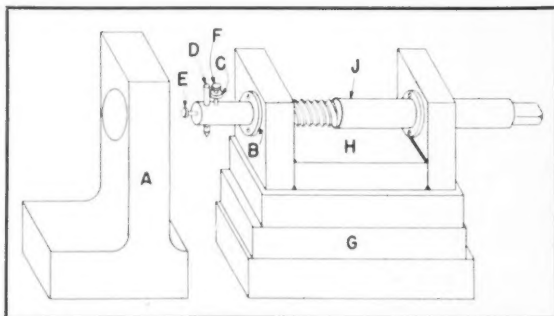
**I**NSTANCES frequently arise in various shops where there is no suitable boring machine for handling relatively large work and where only one or two holes of a given large size are to be bored or possibly bored and tapped. In such cases, a fixture similar to that shown in the accompanying sketch can often be employed to advantage.

Where both boring and tapping are involved, two separate lead bushings and two separate bars are employed. The bushing **B** in the sketch is removable and is internally threaded to

match the threads on the boring or tapping bar used. The boring bar (not shown) is provided with a fine thread suitable for use as a feed; consequently, the bushing employed at **B** has a fine internal thread to correspond to that on the boring bar.

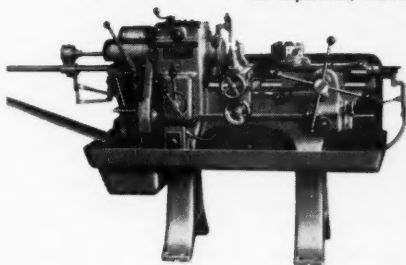
Assuming the hole is to be tapped, the boring bar is removed and a tapping bar, as shown at **J**, is placed in the fixture. Obviously, the tapping bar will automatically be in proper alignment with the previously bored hole in the workpiece, **A**. A bushing having a thread of the same pitch as the one on the tapping bar is substituted at **B**. Both the boring bar and the tapping bar are turned by a crank applied to the square right-hand end.

Since the tapping bar is threaded to match the thread in the bushing **B**, it acts as a lead screw to advance the tool bit **D** at the proper tapping lead. The



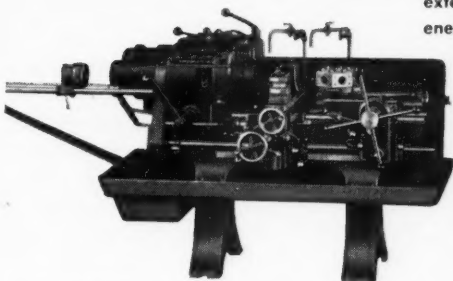
Sketch of emergency fixture for boring and tapping large diameter holes in job work

**No. 2 GEARED ELECTRIC TURRET LATHE**  
Bar capacities, standard work 1" x 7",  
Swing 13½"



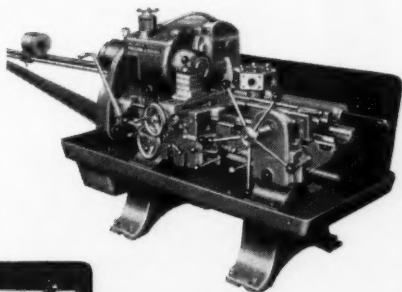
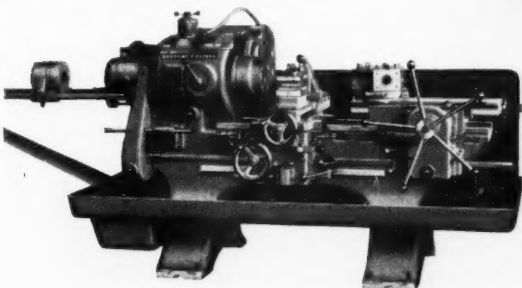
*An Outstanding Line*  
of  
**RAM TYPE TURRET LATHES**

This comprehensive line of Ram Type Turret Lathes features outstanding ease of operation. The most extensive use of anti-friction bearings and hardened-ground alloy steel wearing surfaces combined with highest safety factor in power transmission and utmost rigidity of all tool supporting members lends long lived accuracy and great productive capacity. The exclusively Bardons & Oliver combination of pre-eminent features makes each size a leader in its own field.



**No. 3 UNIVERSAL TURRET LATHE**  
Bar capacities, standard work 1½" x 9",  
light work 2" x 9". Swing 15½"

**No. 7 UNIVERSAL TURRET LATHE**  
Bar capacities, heavy duty work 2½" x 14",  
standard duty work 3" x 14". Swing 21½"



**No. 5 UNIVERSAL TURRET LATHE**  
Bar capacities, heavy duty work 2" x 12",  
standard duty work 2½" x 12". Swing 18"

WE ALSO BUILD A COMPLETE  
LINE OF CUTOFF MACHINES

**BARDONS & OLIVER, INC.**

1137 WEST 9th STREET

CLEVELAND 13, OHIO

bit is held in position in the bar by means of the set screw **E**. A drilled and internally threaded lug, **C**, having a small screw, **F**, is welded to the bit **D** so that when the screw **E** is loosened, the screw **F** can be used to adjust the amount of projection of the cutting edge of the bit from the bar. The fixture body **H** is made of three blocks of steel welded together, the two end blocks being subsequently line bored

to accommodate the two bushings shown. Blocks of any desired size may be employed at **G** to line up the bar with the rough hole to be bored and tapped. The method employed for clamping the work and the fixture may be any appearing most expedient for the job at hand.

## STANDARD TAPER PINS



The high quality and accuracy of Standard Steel Specialty Taper Pins have won them wide acceptance. Milled from bar stock, straight to taper and to extremely close tolerances, these pins give 100% performance. The uniformity and accuracy of the pins saves valuable time at assembly, assuring you trouble free service.

Write for complete catalog giving information on taper pins, Woodruff keys, machine keys and machine racks.

**STANDARD STEEL SPECIALTY  
COMPANY**

BEAVER FALLS

PENNSYLVANIA

PLANTS BEAVER FALLS, PA. • HAMMOND, IND.

## Fixture for Riveting a Thin Washer to Small Diameter Rod

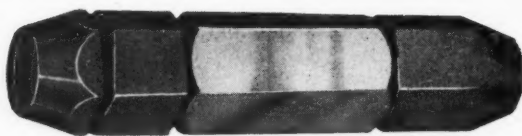
By W. M. HALLIDAY  
England

**T**HE sketch in Fig. 1 shows a riveted assembly which, despite its simplicity, caused considerable difficulty with the method of riveting originally employed. The washer **Y** had to be squarely riveted against the shoulder **Z** on the rod **X**; however, due to the small diameter of the rod, difficulty was encountered in accurately holding the rod without distorting the rod or marring its surfaces while the end was peened over to hold the washer firmly in the desired position. This difficulty was overcome by designing the special holding fixture shown in Fig. 2.

The fixture includes a mild steel body, **A**, which is fastened by means of four screws to a rectangular steel base

## COLLET TYPE PIN GAGE HANDLE

Bushings for cylindrical and thread plug gages.



RED

GREEN

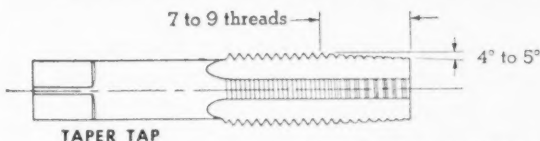
Complete line of gage supplies, handles, blanks, ring gage parts, etc. from stock.

**HURON MACHINE PRODUCTS**

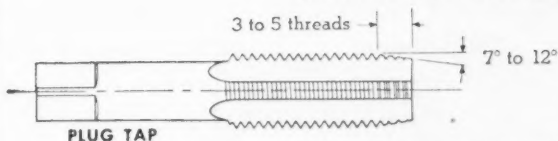
14831 W. WARREN, BOX 146  
DEARBORN • MICHIGAN

# USE THE RIGHT TAP

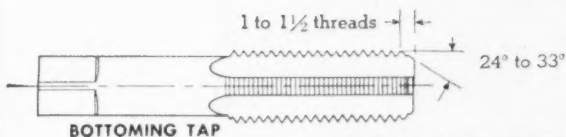
(HOW TO DO MORE TAPPING WITH FEWER TAPS)



TAPER POINT TAPS ARE FOR USE IN THROUGH HOLES. LONG CHAMFER HELPS STRAIGHT STARTING AND DISTRIBUTES CUTTING LOAD.



PLUG POINT TAPS ARE THE MOST COMMONLY USED FOR AVERAGE PRODUCTION. CAN BE USED IN TAPPING THROUGH HOLES OR IN BLIND HOLES IF ENOUGH CLEARANCE IS ALLOWED IN THE BOTTOMS OF THE HOLES.



BOTTOMING TAPS ARE FOR USE IN BLIND HOLES WHERE IT IS NECESSARY TO THREAD ALL THE WAY TO THE BOTTOM.

THREAD MORE HOLES  
WITH FEWER TAPS  
INSIST ON...



**TOOL COMPANY**

NEW BEDFORD, MASS., U. S. A.

**HY-PRO  
TAPS**

plate, **B**. Holes are provided in the base plate for attaching the entire fixture to the platen of the riveting machine. A hole, **C**, is bored vertically through the body **A** near the right-hand side to accommodate, in a tight press fit, a hardened steel bushing, **D**. This bushing is bored out to receive the rod **X** with a slip fit. The upper end of the hole **C** is recessed for a depth slightly less than the thickness of the washer

**Y** and to approximately the same diameter as the washer to provide a slip fit for same. Situated in the hole **C** directly underneath the bushing **B** is a slidable hardened steel cylindrical anvil, **E**, which is bored out concentrically for a certain depth to accommodate the end of the rod **X**.

A narrow slot, **F**, machined in the lower end of the body **A** and a similar slot, **G**, machined in the lower end of the sliding anvil **E** accommodate the operating lever **H**, which is ar-

## Kill moisture absorption



### with DESPACH ROD DRYING OVENS

For all types of baking, drying and ageing



Ovens can be decked—2-4-6 units



Automatically controlled—set it and forget it



Mesh shelving for total heat circulation



Conveniently portable for entire shop use

Electrodes in storage tend to pick up moisture—particularly low hydrogen, stainless steel and non-ferrous types. Despach "WRD" Welding Rod Ovens provide lots of storage room in 10 spacious compartments and do a thorough, steady, dependable dehydrating job. *Specifications:* Outside dimensions—18" x 19" x 18". Max. Temp. 550° F; 1500 Watts; 250 lbs. rod capacity. Write for Bulletin.



381 DESPACH BUILDING  
MINNEAPOLIS 14, MINNESOTA

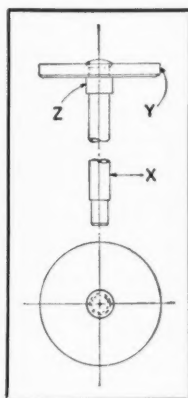


Fig. 1—Sketch of riveted washer and rod assembly

ranged to pivot freely on a fixed fulcrum pin, **I**, fitted through the slot **F**, the depth of which is approximately twice the width of the lever in order to allow for sufficient movement of the lever on its ful-

# Severance Regrinding Service

RECONDITIONING TO NEW-TOOL PERFORMANCE AT A FRACTION OF NEW TOOL COST!

☆ **HIGH SPEED** and **CARBIDE** ☆

Why take less?-- for Safety, Efficiency, Economy--  
insist on genuine factory reconditioning service performed  
by **Severance New Tool Craftsmen!**

## CONSERVE CARBIDE TOOLING



THIS BEFORE AND AFTER PICTURE SHOWS WHAT OUR NEW-TOOL CRAFTSMEN CAN ACTUALLY DO WITH YOUR BATTERED CARBIDE TOOLS OF THIS AND SIMILAR TYPES

## CONSERVE THROUGH REGRINDING



REPRESENTS  
A NEW  
**SEVERANCE**  
MIDGET MILL  
(HIGH SPEED OR CARBIDE)



REPRESENTS  
THE SAME TOOL  
AFTER 20 REGRINDS

YOUR DULL CUTTERS ARE REGROUND BY  
**SEVERANCE NEW-TOOL CRAFTSMEN**

## CONSERVE THROUGH SALVAGE



YOUR DULL  
ROTARY  
FILES  
can be  
ground into



MIDGET MILL  
TYPE TOOLS  
LIKE THIS

ELIMINATES LONG  
DELIVERY WORRIES--  
**Saves Your Dollars!**

☆☆ *We're the Originators* ☆☆  
**OVER 20 YEARS EXPERIENCE IN THIS MONEY SAVING SERVICE**

☆ *We've been copied but not surpassed* ☆

DEPENDABLE DELIVERIES ARE ASSURED ☆ THROUGH SEVERANCE REGRINDING SERVICE  
We Regrind: MIDGET MILLS, ROTARY FILES, BURS, FILE BANDS, COUNTERBORES, COUNTERSINKS, ETC.

SEND YOUR DULL CUTTERS TO

**SEVERANCE TOOL INDUSTRIES, INC.**

724 IOWA AVENUE

In Canada: 60 Front St., W., Toronto

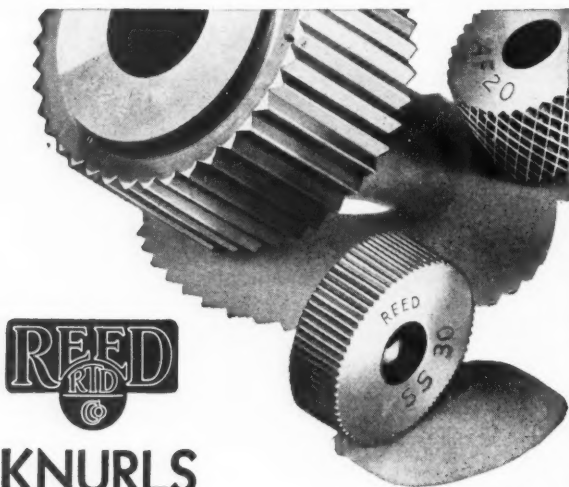
SAGINAW, MICH.

crum pin. The inner end of the lever **H** passes well into the slot **G** in the anvil **E** and is pivoted thereto by the pin **J**. A clearance hole **A**, cross drilled through the body **A** enables the pivot pin **J** to be inserted or removed without removing the base plate **B** from the body. To permit free working movement to the anvil at all radial positions occupied by the lever, the latter has an elongated slot, **K**, through which the pivot pin **J** passes.

The lever **H** is actuated at the opposite end by means of a locking screw, **L**, which is threaded into a vertical hole in the left-hand side of the body **A**. This screw has a large knurled head for finger gripping purposes.

Interposed between the anvil **E** and bushing **D** is a compression spring, **M**, the purpose of which is to force the anvil away from the bushing as soon as the locking screw **L** is released. For the purpose of holding the washer **Y**

firmly in the recess machined in the top of the bushing **D**, a clamping strap, **N**, is provided, a clearance hole being drilled through this member to enable it to be fitted over a stud, **O**, screwed into the body **A**. A knurled locking nut, **P**, on the end of the stud allows for adjustment of clamping strap **N**, the left-hand end of which rests on a step, **Q**, formed on the body **A**. A light tension spring, **R**, located underneath the strap serves to lift the clamping end of the strap clear of the washer when the nut **P** is unscrewed. When mounting or removing a washer



## KNURLS

The lapped finish on the hard knurling surface of the knurl contributes to outstanding performance and longer life.

Over 100 styles and sizes in stock.  
Specially made to your specifications.

## REED ROLLED THREAD DIE CO.

Manufacturers of  
THREAD ROLLING MACHINES and DIES • KNURLS • THREAD ROLLS  
Worcester, Massachusetts, U. S. A.

K251

# Let us serve you too!



No matter what shape of grinding wheel you need—cup, saucer, dish or cone . . . straight, flaring, tapered or recessed—Simonds Abrasive Company's industrially-proven line has it. No matter what type of grinding you do . . . snagging, surfacing, cylindrical or centerless . . . internal, tool sharpening, cutting-off or polishing . . . Simonds free data book lists the right wheel for it.

No matter where you are located—north, south, east or west—there's a Simonds distributor ready to serve you, too, with these accurately specified, quality controlled grinding wheels.

*Write today for Data Book and  
name of your nearby distributor.*

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON  
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

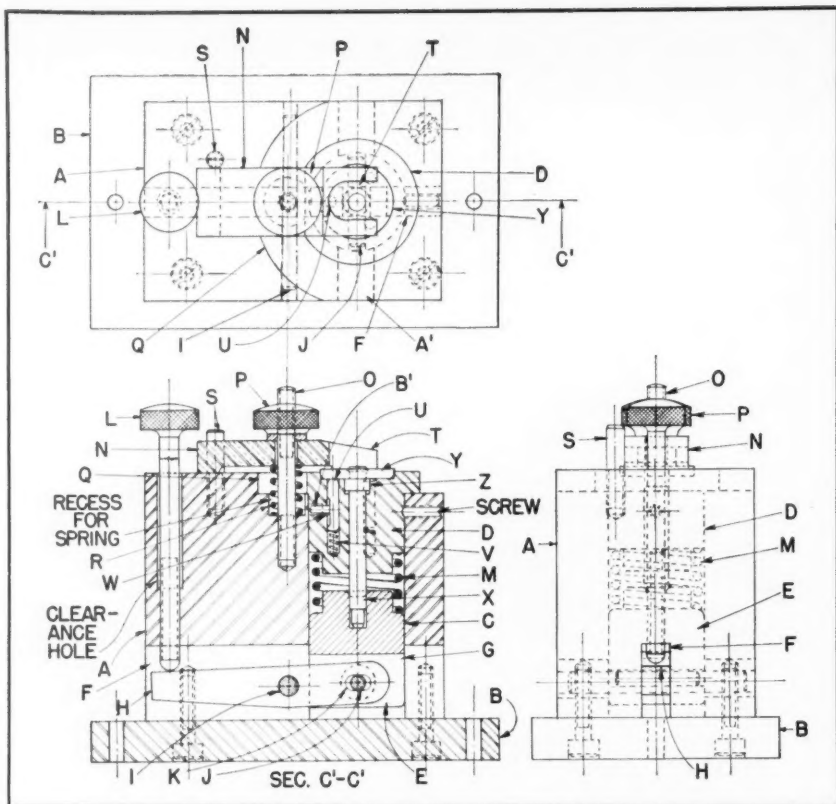


Fig. 2—Sketch of fixture used in riveting together the thin washer and small diameter rod shown in Fig. 1

assembly, the clamping strap **N** must be moved radially in a counterclockwise direction on the stud **O**, the rear end of the strap always resting on the radial step **Q**. To align the strap in its proper clamping position, a stop pin, **S**, is provided in the body **A**. A clearance slot, **T**, machined in the right-hand end of the clamping strap allows for entrance of the riveting machine punch when peening over the projecting end of the rod **X**.

To obtain partial ejection of a fin-

ished riveted assembly when the clamping strap **N** has been swung out of the way, three small ejector pins, **U**, are mounted in the upper end of the bushing **D**. A light compression spring, **V**, is inserted beneath each pin and, to prevent the latter from being forced completely out of its hole, a small flat, **W**, is machined across one side. Small screws **B** threaded firmly into tapped holes in the sides of the bushing **D** serve to arrest the movement of each spring-loaded pin.

BE *Sure* YOUR  
NEW ENGINE LATHE  
CAN *Take* IT!

The engine lathe you buy today could be the one you will call upon for 'round-the-clock pro-

duction. Make sure, before you buy, that the lathe of your choice can take such punishment.

**ASK ONE QUESTION!**

What is the headstock gear arrangement?

**MAKE SURE OF THREE POINTS**

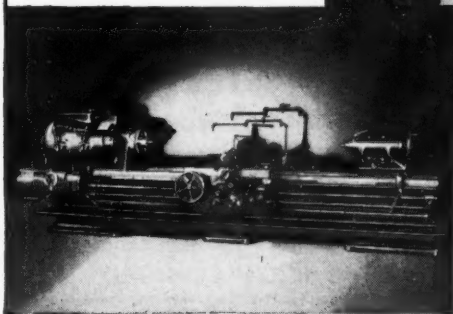

- (1) That all gears are arranged in a horizontal plane, easy of access.
- (2) That gears are in constant mesh, with speed changes effected by means of sliding jaw clutches, eliminating gear wear due to shifting action.
- (3) That the "back gear" is in front of the spindle, exerting its powerful downward thrust to offset the lifting action of the tool when heavy cuts are made.

On these three points long life for engine lathes depends. At these three points Boyé & Emmes Long Life, Heavy Duty Engine Lathes excel.

**GET THE FACTS**

Write for our free Bulletin No. 603 today and count the B & E exclusives. Tomorrow you may need the information.

"Back-gear-in-front" guards spindle bearings during heavy cuts.




**BOYÉ & EMMES**  
**MACHINE TOOL COMPANY**  
123 CALDWELL DRIVE  
CINCINNATI 16, OHIO

To use the fixture, the screw **L** is first unscrewed slightly to allow the anvil **E** to move downward a small amount in the hole **C**. A rod is then inserted through the bushing **D** until the end rests on the bottom of the blind hole in the anvil **E**. A washer is next slipped into the recess in the upper end of the bushing **D** and is clamped in the recess by means of the strap **N**. Following this, the screw **L** is threaded

down into the body **A**, thereby causing the anvil **E** and the rod **X** to rise in the hole **C**. This movement is arrested when the face of the shoulder **Z** on the rod bears against the underside of the washer **Y**. The screw **L** is then firmly locked in this position. The projecting end of the rod may now be peened over in the usual manner by passing the punch of the riveting machine through the slot **T** in the strap end.

When the parts have been properly riveted together, the screw **L** is released and the strap **N** swung radially to clear the side of the washer, which may then be lifted out of the bushing **D**. As soon as the strap **N** is removed from the top of the washer, the three spring-loaded ejector pins **U** lift the entire assembly slightly out of the bushing to afford a suitable grip for the operator.



**WHO\***

No question about it. It's your best source of supply for precision "milled-from-the-bar" screw machine products.

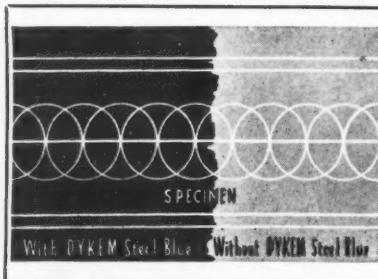
CAP SCREWS	COUPLING BOLTS
SET SCREWS	MILLED STUDS

**Wm. H. Ottemiller Company**  
York, Penna.

## Concentric Chamfering of Tubes with Minimum Loss of Time

By JOHN ROGERS

**T**O eliminate a separate lathe operation, the precision chamfering of tubes can be accomplished effectively and efficiently with a device of the design shown in the accompanying



## DYKEM STEEL BLUE

**Stops Losses in Making Dies and Templates**

Simply brush on, right at the bench; ready for the lay-out in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

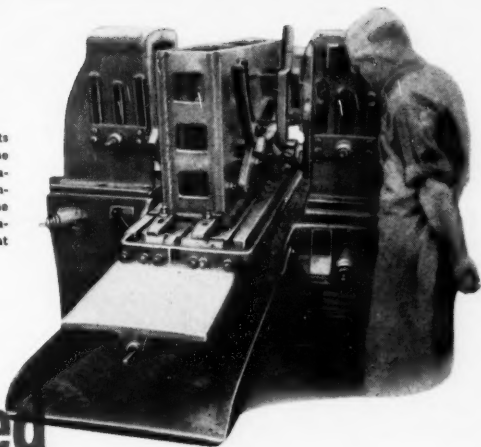
**THE DYKEM COMPANY**

2301F NORTH 11th ST.

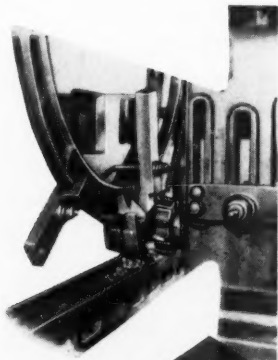
ST. LOUIS, MO.

OK Carbide Cutters mill vital  
"Thunderjet" forgings — 11

As reported previously, Liberty Products Corporation, Farmingdale, L.I., produces the forged-steel bulkhead for Republic Aviation's F-84 "Thunderjet." This vital assembly provides the connection point for the wing spars, and hence every milling operation must be . . . properly performed — yet at minimum cost.



**"properly  
performed  
... at minimum cost!"**



SECOND OPERATION on these tough, heat-treated forgings involves milling the spar-connection bosses to proper thickness. To do this, the piece is clamped to a box-section fixture set up on a Kearney & Trecker No. D-11 duplex milling machine. The two bosses are milled with a 7-in. dia OK face mill having negative axial and radial rakes and fitted with carbide-tipped blades. Spindle speed is 200 rpm.; table feed 5.3 in. per min. This figures out to a cutting speed of 360 surface ft. per min., and a chip load of 0.0022 in. per tooth.

It is important that these bosses be smoothly milled to a thickness tolerance of 0.005 in. (actually 0.004 in. is easily maintained). Production amounts to three pieces per hour, both sides of two bosses being milled. Nine pieces are obtained per cutter grind.

Economical milling is realized throughout the Liberty Products plant by standardizing on OK cutters. Basic reasons for this choice are: OK cutters are *designed and made* so that each tooth takes its share of the load, resulting in smooth finishes and high metal-removal rates. The wedge-shaped blades require no locking devices. They can't pull out or twist to spoil the cut, but they can be removed quickly for replacement. By making blades interchangeable in several sizes of a specific type of cutter body, economy in stocking of blades is promoted.

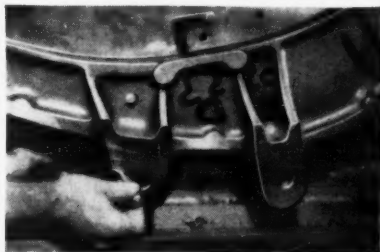
You may not be machining aircraft forgings to exacting specifications, but OK cutters will serve you just as efficiently regardless of material. We offer tools designed for negative or positive rakes, and supply high-speed steel, cast-alloy or cemented carbide blades.

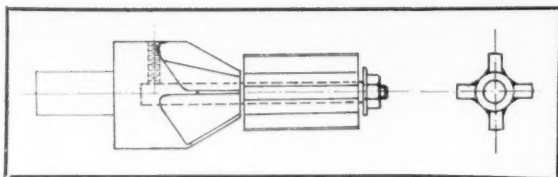
When you get our complete story, you will see the logic of standardization on OK milling cutters, counterbores, facing heads, hollow mills, and reamers. Write for Catalog "Modern Milling Cutters for Modern Milling Machines."



**modern milling cutters  
for  
modern milling machines**

**THE OK TOOL COMPANY, WILTON, N. H.**  
Division Williams and Hussey Machine Company, Inc.





Sketch of device for concentric chamfering of tubes with minimum loss of time

sketch. The device comprises a standard (or special) countersink which is provided with a "free-wheeling" pilot that permits handling of the workpiece by hand and guides the work as it is forced against the cutter by the operator. The pilot is made of steel blades welded onto a round hub. The hub is bored and the blades are turned concentric with the hub bore. The resulting spider-like weldment is slipped over a shouldered shaft which, in turn, is fastened into the pilot hole of the countersink cutter. The distance from this cutter to the shoulder of the shaft is slightly longer than the overall

spider length. A nut and washer prevent the spider from coming off the shaft.

The chamfering device can be used on a lathe or drill press or can be mounted directly on a small gearhead motor as a self-contained unit. Additional time savings can be effected in some applications by letting the self-contained unit operate continuously next to some other production machine, inasmuch as the unit is safe and will not pull the workpiece from the operator's hands, since slanted or "cocked" entry or tight workpieces will only result in stoppage of the pilot and will not affect the operation.

## Machine Bases

*Fabricated* TO

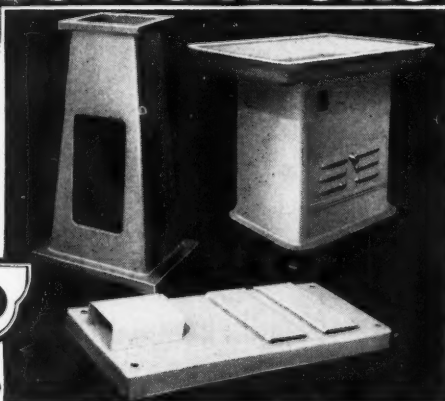
**SPECIFICATIONS**

There's no substitute for "Accuracy" in the fabrication of Plate and Sheet Metal products, nor is there a substitute for "Experience" in the forming and welding of such products. With Littleford you can be assured of accuracy and experience in the fabrication of Machine Bases, Guards, Pans and Louver Covers. Littleford has been serving industry since 1882 and these years of skill and "know how" are ready to serve you too. See how fabricated bases can save you money. Send your blue prints for an estimate of cost or write for the Bulletin on Bases.

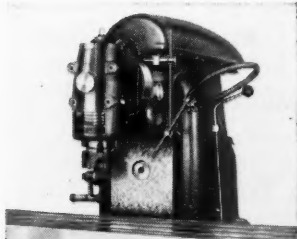
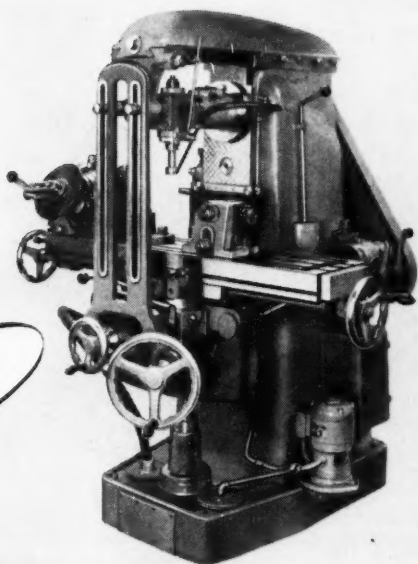


**LITTLEFORD**

LITTLEFORD BROS., INC.  
433 E. Pearl St., Cincinnati 2, Ohio



*Swedish  
Craftsmanship!*



Sojo Vertical Milling Attachment

The Sojo "Plain" Milling Machine



## the **SAJO** "UNIVERSAL" MILLING MACHINE

exemplifies the expert workmanship that is traditional in Swedish machine tools. Like all SAJO Millers, this new Universal Milling Machine was designed and built to the highest standards of quality and practical utility.

Avoidance of exterior "luxury" features, slight in value but substantial in cost, and concentration on the vital factors of construction, enable the SAJO to deliver top performance at moderate cost.

SAJO Millers are available in Plain and Universal types, with longitudinal power table feed only, or with power feed in all directions. Screws and dials are in the U. S. inch system.

★ **Standard Equipment includes:**  
3 HP motor and starter equipment, motor driven coolant system, adjustable table feed nut to allow climb-milling, 1" arbor, arbor support brace.

★ **Extra Equipment:**  
Universal Dividing Head, Vertical Milling Attachment, Slotting Attachment, Swivel Base Vise, Rotary Table.

### CONDENSED SPECIFICATIONS

Table Size ..... 41 $\frac{1}{2}$ " x 9 $\frac{1}{4}$ "  
Longitudinal travel: Plain Miller ..... 24 $\frac{1}{2}$ "  
Universal Miller ..... 27 $\frac{1}{2}$ "  
Transverse travel ..... 8 $\frac{1}{2}$ "  
Vertical travel ..... 19"  
12 spindle speeds ..... 36-1540 RPM  
Table feeds ..... 12  
Taper in spindle ..... No. 40 NMT  
Main motor ..... 3 HP

Precision anti-friction bearings on spindle and gear shafts  
One-piece column and base  
Net weight—2200 lbs.

*Write for Catalog*



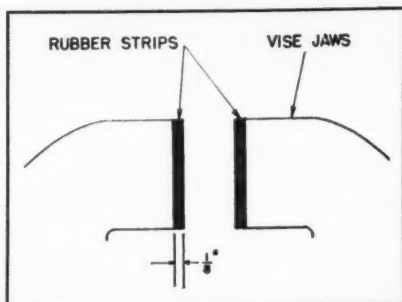
NO PRIORITY — PROMPT DELIVERY — ATTRACTIVE PRICE

**AUSTIN INDUSTRIAL CORP.** 76-H MAMARONECK AVE.  
DEALERS IN PRINCIPAL CITIES WHITE PLAINS, N. Y.

## Rubber Strips on Vise Jaws Prevent Marring of Delicate Work

By IRWIN MANSFIELD

**A** METHOD whereby delicate work or work having highly polished surfaces can be held in a bench or machine vise without marring or crushing is illustrated in the accompanying sketch. The method involves the use



Rubber strips cemented to vise jaws prevent marring of delicate or highly polished work.

of two strips of rubber approximately  $\frac{1}{8}$  inch thick and as long as the jaws are wide which are attached to the vise jaws by applying a coating of glue or rubber cement. The cement holds the rubber strips firmly to the vise jaws and yet allows the strips to be quickly removed when not needed.



**SOMERSET Radius Dresser SAVES TIME**

Thousands of Somerset Dressers in service. Offer outstanding features — Wheel is dressed from below, avoids removal of guard. Stop pins permit rotation thru 180° or 90° either direction. Wear ever bearing is dustproof.

Write for illustrated folder. Immediate Delivery

**SOMERSET TOOL CO.** 320 Virginia St. Hillside, N. J.

**DOES IT BETTER  
DOES IT FASTER**



**SIMPLEX-M  
ABRASIVE BAND  
GRINDER**

The precision of a machine tool plus the durability of a workhorse. Complete with  $\frac{1}{2}$  H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

OTHER STYLES AND SIZES IN NEW  
MANUAL ON FINISHING—WRITE TODAY

**WALLS SALES CORP.**  
333 Nassau Avenue, Brooklyn 22, N. Y.

## Tool for Forming Ball Joint Halves with Ball Reamer

By WILLIAM NEIDHARDT

**T**HE sketch herewith shows a tool devised by the writer, a toolroom attendant at Allis-Chalmers Manufacturing Company, to be used in place of a spanner wrench when forming  $\frac{7}{8}$ -inch ball joint halves with a ball reamer. Previously, the lower part was chucked

**Quick  
Shipment on**

**TAPER  
ATTACHMENTS**

For All Lathes—Old or New—  
9" to 36" Swing  
Write for Bulletin  
**MASTER-TAPER COMPANY**  
4531 N. Beacon St., Chicago 40  
Excl. Mfrs. of Taper Attachments



**\$29.50  
to  
\$149.50**



**ROTO-CLONE**

**"Grounds" Dust**

**at  
Solar  
Aircraft**

## **Compact Type D Central System Services 14 Dust Sources in Busy Tool Room**

Good housekeeping encourages good workmanship. That's why Solar Aircraft, San Diego, Calif., producer of vital aircraft parts, has applied AAF Roto-Clone\* Dust Control throughout its tool room.

Fourteen dust sources, including bench, cutter, drill and surface grinders, are serviced by a single Type D Roto-Clone—the dynamic precipitator which combines the functions of exhausting, separating and storing dust in a single unit. Note how its compact design permits location near dust sources—holding piping to a minimum and concentrating dust storage at one convenient disposal point.

The Type D Roto-Clone can be adapted to any metal grinding or finishing operation.

When dust sources are grouped (as above), it can operate as a central system. For the isolated job, there's a Type D of a size and capacity to serve the individual operation. In all cases, the Type D's high collection efficiency, low operating cost and compact design result in an efficient, economical installation.

Why not have an AAF representative make a "dust check" of your metal working operations? If you have a problem, he has the solution. Call him today or write us direct.

*\*ROTO-CLONE is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

**American Air Filter**  
COMPANY, INC.



100 Central Avenue, Louisville 8, Ky. • American Air Filter of Canada, Ltd., Montreal, P. Q. • Pacific Division Office, San Francisco, California



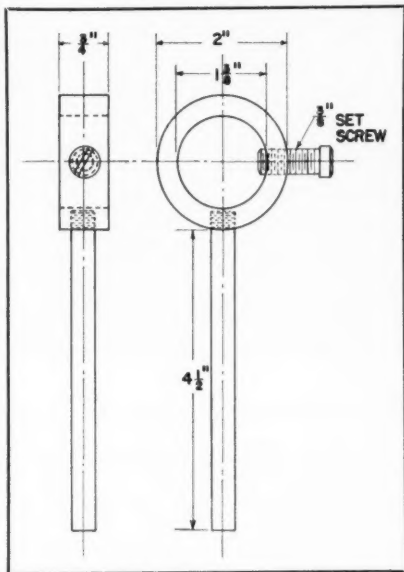
Especially written for safety inspectors and maintenance supervisors directly responsible for the safety of press operators, "Power Press Protection" is yours for the asking. Contains valuable information on the maintenance and safe operation of power presses. Send for your copy today.



**JUNKIN SAFETY  
APPLIANCE CO.**

101 S. Floyd  
LOUISVILLE 8, KENTUCKY

in a screw machine, the ball reamer placed inside the upper part, and the parts screwed together with a spanner wrench. When the parts tightened, the reamer was turned by hand and the operation repeated until the ball gage fit. Since both parts are made of brass, use of the spanner wrench stretched

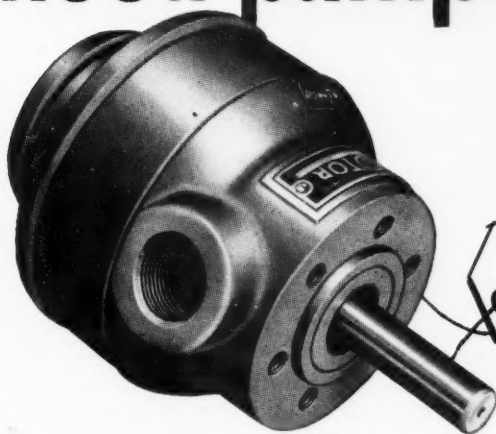


Sketch of tool to be used in place of spanner wrench when forming  $\frac{1}{4}$ -inch ball joint halves with ball reamer

the  $\frac{1}{4}$ -inch hole and marred the turn of the upper part. The wrench also slipped frequently, making it necessary to pick the wrench up and lay it aside each time it was used.

The substitute tool shown in the sketch can be slipped over the upper part of the ball joint half and the set screw turned into the  $\frac{3}{8}$ -inch tapped hole. Furthermore, it is not necessary to remove the tool until the operation has been completed and checked with the gage, and the tool does not interfere in any way with the operator.

# need pumps fast?



IMMEDIATE  
DELIVERY

**Gerotor Hydraulic Pumps** . . . 3 types, 11 sizes, for continuous pressures up to 1000 p.s.i. . . . in some sizes, up to 1200 p.s.i. continuous, 1500 intermittent. Deliveries from .4 g.p.m. at 1800 r.p.m. to 40 at 1200.

## call or wire

**GEROTOR**

**GEROTOR MAY  
CORPORATION**

**Maryland Ave. & Oliver St., Baltimore 3, Md. • Phone MULberry 8585**

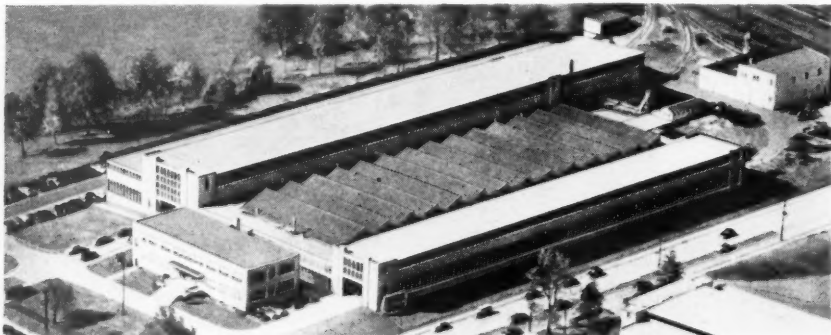
## news of the industry

### King Passes Half-Century Milestone

King Machine Tool Division, American Steel Foundries, Cincinnati 29, Ohio, manufacturer of vertical boring and turning machines, is currently celebrating its golden anniversary. Founded by Rufus King in 1901, the business was originally incorporated as the Wais-King Tool Company. Three years later, when E. A. Muller joined the organization as vice president and general manager, the corporate name was changed to The King Machine Tool Company, and so remained for the succeeding 44 years until 1948 when the business was acquired

by American Steel Foundries.

Under the able guidance of E. A. Muller, assisted in later years by his son, C. F. Muller, who succeeded to the presidency upon his father's retirement in 1943, the enterprise grew from a small beginning to an organization of world-wide renown. When, in 1948, the King business was acquired by American Steel Foundries, it had already been utilizing for several years the increased facilities of its present ultra-modern home at 1150 Tennessee Avenue. Now known as the King Machine Tool Division of American Steel Foundries, the enterprise is conducted under the leadership of Charles F. Elmes.



Ultra-modern plant of King Machine Tool Division, American Steel Foundries, Cincinnati, Ohio

## Syntron Company Purchases Canadian Plant

Syntron Co., Homer City, Pa., manufacturer of vibratory material handling equipment, portable power tools, diesel pile hammers, selenium rectifiers, shaft seals, paper joggers, and so on, has organized a Canadian subsidiary, Syntron Ltd., and purchased a manufacturing plant in Stoney Creek (Hamilton area), Ontario, Canada. The Syntron Company has disclosed that selenium rectifiers will be the first items to go into production, although ultimately the entire line will be manufactured in the Stoney Creek plant. It is expected that production will start sometime in September or October of this year.

## Utica Drop Forge Establishes Scholarships

Utica Drop Forge & Tool Corp., Utica, N. Y., has announced the establishment of two scholarships for undergraduate students at Stevens Institute of Technology. This year the Stevens Faculty Committee on Student Aid designated two second-semester juniors, Laurence A. Minck of Yonkers, N. Y., and Robert A. Lohmann of Orange Grove, N. J. Hereafter, the Faculty Committee will designate two students at the beginning of the sophomore year and the scholarships will be effective for the remainder of the college year.

These Utica Drop Forge Scholarships provide that the recipients accept summer employment with Utica Drop Forge, and, upon graduation, they are given an opportunity of employment with the firm, if they have previously proved satisfactory.



**SPEEDI-SPACER**

eliminates waiting for and cost of jigs and fixtures

Puts work  
**"ON THE SPOT"**  
Quickly...  
Accurately...  
at Lowest Cost!

SPEEDI-SPACER saves the cost of . . . and waiting for . . . jigs, fixtures, gauges, dies and templates. It also eliminates storage, obsolescence and maintenance on these costly production accessories. Best of all, SPEEDI-SPACER costs far less than comparable units. With it, any good upright or radial drill or vertical milling machine becomes an accurate jig boring tool; highly skilled labor is unnecessary.

Easily transferred from machine to machine, the SPEEDI-SPACER can be set-up in a fraction of the time required for setting a jig borer or boring mill. Nine longitudinal and nine transverse stop screws provide precise positioning, maintained by positive locks.

Longitudinal travel is 15"; transverse, 10"; with nine stops in each direction. Overall dimensions are 28" by 22". Mounting T-slots are provided. Find out how much the SPEEDI-SPACER can save in your shop.



**QUEEN CITY  
MACHINE TOOL CO.**

Write today...  
for literature

**Queen City Machine Tool Co.**  
233 East Second St., Cincinnati 2, Ohio

## Crane Packing Company Elects New Board Chairman and President

The retirement of A. W. Payne as chairman of the board of directors of Crane Packing Co., Chicago 13, Ill., after more than 30 years of active participation has been announced by the board of directors. Frank E. Payne, formerly president of the company, has been elected chairman of the board and

Karl V. Rohlen has succeeded to the presidency from his former position of vice president and general manager.

The new board chairman, Frank E. Payne, founded the company in 1916 and since



Karl V. Rohlen

that time has been singularly active in building up the business from the status of a small operation to its present position as a leading manufacturer of mechanical packing, shaft seals, lapping machines, and similar products. Mr. Payne has done much to further the field of packings as evidenced by his personal holding of many basic design patents. He also pioneered the development of mechanical type seals.

Mr. Rohlen graduated from the University of Illinois in 1935 and was employed in the sales department of the company until 1942 when he entered military service. Upon his discharge as a Lieutenant Colonel in 1946, he returned to the company to serve first in the capacity of assistant to the president and then vice president and general manager.

*High Speed*  
**COUNTERBORES**  
**BACK**  
**SPOT**  
**FACERS**



Interchangeable

*Catalog  
on  
Request*

**BICKNELL-THOMAS COMPANY**  
Greenfield      Massachusetts

*You Need an Extra Hand Now  
to Speed Up Production!*

**HEIMANN TRANSFER SCREW SETS**




Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

IN 11 SIZES—No. 6 to 1"  
N.C. In all S.A.E. sizes.

**HEIMANN MFG. CO. • URBANA, OHIO**

**WE AIM**  
TO SAVE INDUSTRY

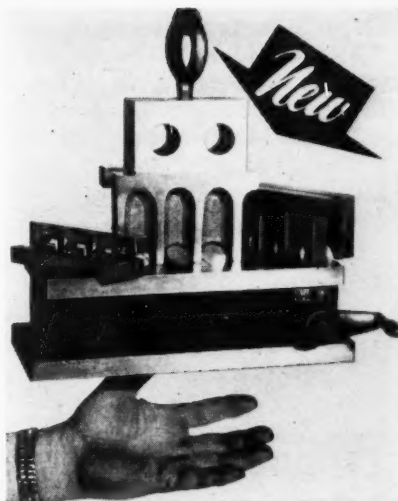
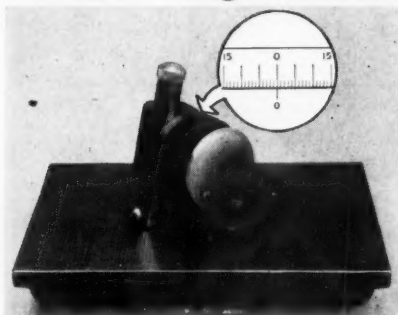
**1,000,000**

HIGHLY SKILLED

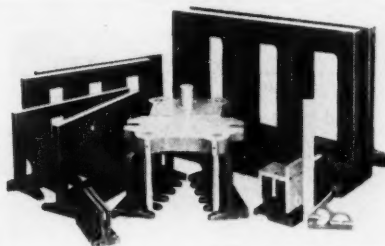
**MAN HOURS**

in 1952-53

**"MAGIC" Angle Dresser**



**"MAGIC" Parallels**

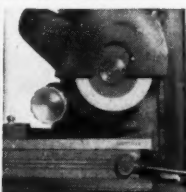
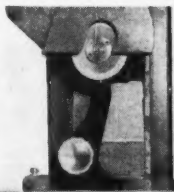


**"MAGIC" Diamond Holder**

*Place the diamond to the wheel*

- Saves elevation screw and nut.
- Saves spindle housing or knee ways.
- Saves gears and bearings.

**SALESMEN WANTED**



**WRITE FOR  
CIRCULAR  
AND PRICES**

**MAGIC CITY MACHINE TOOL CO.**  
2128 S. WALNUT ST., MUNCIE, INDIANA

## New Pipe Tool Packaging Announced by Capewell

Bright, new packages for its complete line of Armstrong-Bridgeport Pipe Tools has been announced by The

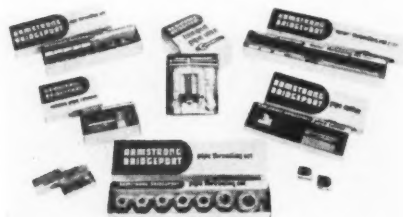


Illustration showing new packaging now being used by Capewell Manufacturing Company for its Armstrong-Bridgeport Pipe Tool line

Capewell Mfg. Co., 67 Governor St., Hartford 2, Conn. Tools are now being shipped in containers, colored in orange, black and gold. Vibrant orange

is used for the background color, which sets off the Capewell name in white lettering on a black panel.

Each container is sturdily constructed to withstand abuse in shipment and handling. Corner strength prevents breakdown on the edges and sides and facilitates stacking in shelves or bins. Legibility of marking on the ends simplifies material identification and speeds handling for stock clerks. In addition, each package is specially designed to hold its tool snugly with parts in their proper place to prevent shifting or rubbing.

## Van Norman Names C. R. Crowder Executive Vice President

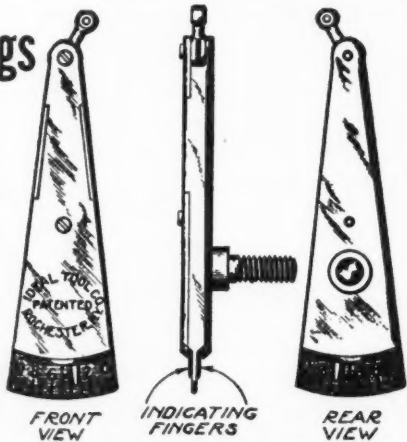
James Y. Scott, president of Van Norman Co., Springfield, Mass., has announced the appointment of Charles

## DIAL Indicator Readings

### From Front or Rear

- Accurate readings from the front or rear of an IDEAL INDICATOR is especially helpful when locating holes or where the indicator is fastened to a revolving spindle.

- IDEAL INDICATORS have been serving industry for 40 years with complete satisfaction. Prices shown include holder. Why pay more for superior service?



Price . . . \$6.00

Write for complete details.

**IDEAL TOOL CO., 407 RIVER ST., ROCHESTER 12, N. Y.**

# WRITE FOR

**FREE**

**Hassall  
decimal-  
equivalent  
wall chart**

$\frac{1}{32}$ —.0156— $\frac{1}{64}$	$\frac{17}{32}$ —.5156— $\frac{33}{64}$
$\frac{1}{16}$ —.0312	$\frac{9}{16}$ —.5625
$\frac{3}{32}$ —.0469— $\frac{3}{64}$	$\frac{19}{32}$ —.5781— $\frac{37}{64}$
$\frac{1}{8}$ —.0625	$\frac{5}{8}$ —.6250
$\frac{5}{32}$ —.0781— $\frac{5}{64}$	$\frac{21}{32}$ —.6406— $\frac{41}{64}$
$\frac{1}{4}$ —.1094— $\frac{7}{64}$	$\frac{11}{16}$ —.6719— $\frac{43}{64}$
$\frac{5}{16}$ —.1250	$\frac{23}{32}$ —.7187
$\frac{3}{8}$ —.1406— $\frac{9}{64}$	$\frac{3}{4}$ —.7500
$\frac{7}{32}$ —.1562	$\frac{25}{32}$ —.7656— $\frac{49}{64}$
$\frac{1}{2}$ —.1719— $\frac{11}{64}$	$\frac{13}{16}$ —.7812
$\frac{9}{32}$ —.1875	$\frac{27}{32}$ —.8125
$\frac{5}{8}$ —.2031— $\frac{13}{64}$	$\frac{7}{8}$ —.8750
$\frac{11}{32}$ —.2187	$\frac{29}{32}$ —.8906— $\frac{57}{64}$
$\frac{3}{4}$ —.2344— $\frac{15}{64}$	$\frac{15}{16}$ —.9219— $\frac{59}{64}$
$\frac{7}{8}$ —.2500	$\frac{31}{32}$ —.9331— $\frac{61}{64}$
$\frac{15}{16}$ —.2656— $\frac{17}{64}$	$\frac{63}{64}$ —.9844
$\frac{1}{2}$ —.2812	$1$ —1.0000
$\frac{1}{4}$ —.2969— $\frac{19}{64}$	
$\frac{1}{8}$ —.3125	
$\frac{1}{16}$ —.3281— $\frac{21}{64}$	
$\frac{1}{32}$ —.3437	
$\frac{1}{64}$ —.3594— $\frac{23}{64}$	
$\frac{1}{128}$ —.3750	
$\frac{1}{256}$ —.3906— $\frac{25}{64}$	
$\frac{1}{512}$ —.4062	
$\frac{1}{1024}$ —.4219— $\frac{27}{64}$	
$\frac{1}{2048}$ —.4375	
$\frac{1}{4096}$ —.4531— $\frac{29}{64}$	
$\frac{1}{8192}$ —.4687	
$\frac{1}{16384}$ —.4844— $\frac{31}{64}$	
$\frac{1}{32768}$ —.5000	

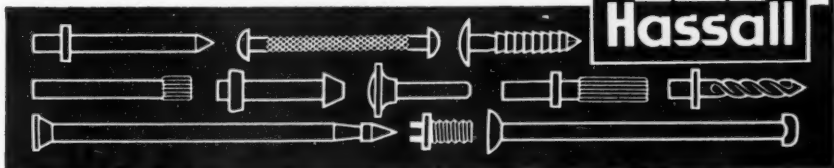
JOHN HASSALL INC., BROOKLYN 22, N.Y. SPECIAL NAILS RIVETS SCREWS

In such popular demand (we've given away 50,000)—we've made it better. The new chart is far easier to read! In three colors to automatically signal decimal-equivalents of fractions. The special products which frame the chart are a constant reminder of a good source of cold-headed parts.

**JOHN HASSALL, INC.**

394 OAKLAND STREET • BROOKLYN 22, N. Y.

ESTABLISHED 1850



R. Crowder as executive vice president of the company. Mr. Crowder started with Van Norman 24 years ago as a salesman for the Van Norman line of automotive service equipment in the Pacific Northwest territory, and then became successively sales promotion manager, sales manager, and vice president and director of sales of the Automotive Division. His new post places him in charge of all Van Norman man-

ufacturing activities, including those pertaining to milling machines, radius grinders, and production grinding machines, as well as automotive service equipment.



C. R. Crowder

**THREAD MEASURING MADE EASY  
WITH NEW 60° THREAD TRIANGLES**



Quickly checks all 60° standard and special threads from 4 to 56 pitch...ANY O.D. No "fancy" calculations...just add a constant to O.D. That's all. Comes complete with chart.

**\$8.60 PPD**

**FREE 10-DAY TRIAL.  
WRITE FOR BULLETIN.**

**MONTGOMERY & COMPANY, INC.**  
53-M PARK PLACE • NEW YORK 7 N.Y.

**SAWING MILLING**



**GROB BROTHERS**

GRAFTON WISCONSIN

### William Luther Lewis

William Luther Lewis, president of the Chicago Pneumatic Tool Co., 8 E. 44th St., New York 17, N. Y., died recently in the Northern Westchester Hospital after an illness with which he was stricken at his home on Pleasantville Road, Briarcliff Manor. He was 68 years old.

A native of Wales, Mr. Lewis was brought to this country as a boy and first worked in Bridgeport, Ohio, for a lumber company. Later he came to the attention of Charles M. Schwab, who aided his advancement. Mr. Lewis joined the Bethlehem Steel organization and rose to assistant controller. In 1930 he was elected vice president, secretary and treasurer of the Chicago Pneumatic Tool Company, and in 1946 he was elected president.

### IMMEDIATE DELIVERY MACHINE TOOLING

FOR ALL STANDARD MACHINES

Our Ten Million Dollar Tool Crib serves Big and Little plants all over the nation. Everything Guaranteed!

We Buy Mfg. Plants  
Machine Shops,  
Big Tooling  
Inventories

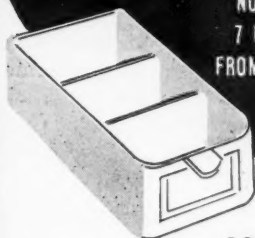


### U. S. INDUSTRIAL TOOLS

414 So. Central Ave., Los Angeles 13, Calif.

# SMALL PARTS CABINETS

NOW AVAILABLE IN  
7 USEFUL SIZES —  
FROM 8 TO 64 DRAWERS



## 1001 Time-Saving Uses For Home and Business!

Ideal for small parts...washers...nails...screws...bolts...nuts...drills  
...taps...carbide tips...mounted points...tools...brads...tacks...and  
YOU NAME IT!

All-metal JIFFY Cabinets have a sturdy steel frame with hammered aluminum finish in silver-gray color.

Drawers are of solid aluminum, measuring 1 1/4" high, 2 3/4" wide and 5 3/4" deep. Individual metal drawer guides keep the drawers in a free-sliding position.

Each JIFFY Cabinet is supplied with its full requirement of removable drawer-dividers and index labels.

**CLIP AND MAIL** TO: **HANDY PRODUCTS CO.**  
P.O. BOX 2447, CLEVELAND 12, OHIO

PLEASE SEND IMMEDIATELY THE QUANTITY AND SIZE JIFFY UNIT LISTED BELOW

☐ 64 Drw. @ \$24.95°   ☐ 48 Drw. @ \$19.95°   ☐ 32 Drw. @ \$12.95°   ☐ 24 Drw. @ \$9.95°   ☐ 16 Drw. @ \$7.95°   ☐ 12 Drw. @ \$6.95   ☐ 8 Drw. @ \$4.95°

WE PAY ALL SHIPPING COSTS

FIRM .....

ADDRESS .....

CITY ..... State .....

ORDERED BY ..... DEPT. ....

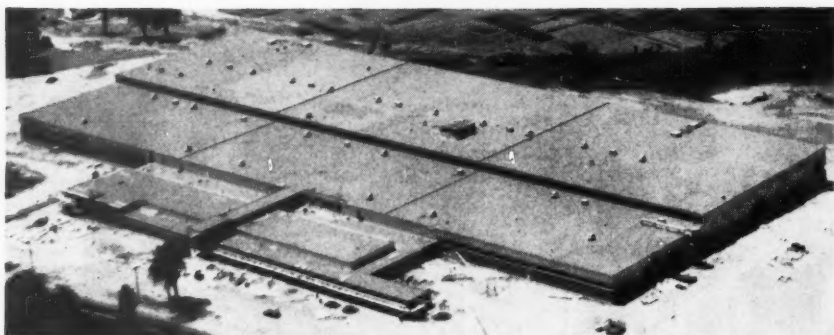
Please Ship as Follows:

☐ Open Account, Purchase Order Enclosed.

☐ Check or Money Order Enclosed.

☐ C.O.D.

Ohio Customers Add 3% Sales Tax.



View of Norton Company's new grinding machine plant nearing completion in Worcester, Mass.

### Norton Expansion Nears Completion

The Norton Company has announced that its new grinding machine expansion in Worcester is nearing completion, and it is expected that this \$6,000,000 6½-acre plant will be in full operation this fall or early winter.

Heavy equipment is now being moved into the new plant.

All types of Norton surface, cylindrical, roll, toolroom, and special grinders, as well as lapping machines, will be made in the new plant, which will add 50 per cent to the company's present capacity.

**NEW!**



**KOEBELITE**

TRADE MARK

## Cemented Diamond Particles

More efficient than conventional single diamond tools—with MUCH LONGER LIFE.  
Reduces set-up time—Increases production.

Now ready and proven: Koebelite CDP (Cemented Diamond Particles) Tool for Ex-Coil-O and J & L Thread Grinders, at left.

**KOEBEL DIAMOND TOOL COMPANY**  
9456 GRINNELL AVENUE, DETROIT 13, MICH.

FIRST to give diamond users the advantage of diamonds set in powdered metal

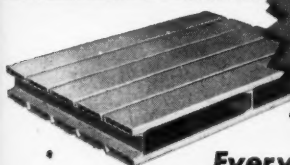
## Sloped Bottom BOX and STAND



Item No. D-28

Item No. C-151

for simplified handling of small parts, economically. BOX (D-28) is of all-steel construction equipped with stacking brackets. Hand lever releases parts that slide down to waist-high tray on stand for easy disposal by seated or standing operator. Can be furnished with crane lugs, for platform trucks and fork trucks. STAND (C-451) heavy-duty all-steel reinforced construction.



**Every  
Type of**

## All-Steel PALLETS

Single- or double-faced. Any size and capacity.



Item No.  
B-727

## All-Metal PALLET RACK and Nesting Ring

Single-face pallet rack with stacking corners. Nesting ring can be furnished permanently welded to pallet. Special rolled channel steel—all welded construction. (We build all sizes.)

**P-S**  
*Materials*  
**HANDLING  
EQUIPMENT**  
CUSTOM-BUILT TO MEET  
YOUR NEEDS

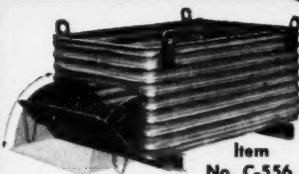
TRUCKS—SKID PLATFORMS—  
PALLETS—RACKS—WORK  
TABLES—BOX and BARREL  
GRABS—CARTS—BOXES—  
STORAGE BINS

We design and build all types of materials handling equipment... for pick-up, loading, moving, dumping or storage... made of metal, or wood, or combination.

When Ordering Always give "item" number; this will help prevent error. All prices are f.o.b. Detroit. Prices are subject to change without notice.

Designed and Manufactured by

**Palmer Shile Co.**  
1075 ELLINGTON AVENUE • DETROIT 27, MICHIGAN



Item  
No. C-556

## Corrugated Steel STACKING BOX with HINGED DOOR

One of the convenient uses of the box is on a steel stand. Door opens to any set angle by means of the chain, simplifying parts disposal by standing or sitting workmen.

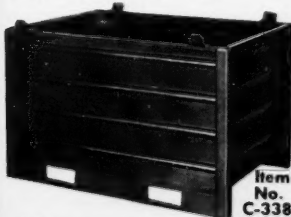
Built to dimensions and load capacity specified by the customer, including underneath clearance. Crane lugs, stacking brackets, and color of paint desired may be specified.



Item  
B-746

## CORRUGATED BOX WITH LEGS

For moving or storing heavy metal parts; built of heavy corrugated steel; reinforced throughout with angle iron. Legs are designed to permit complete accessibility with fork or power lift truck. Made in any size or load capacity.



Item  
No. C-338

## CORRUGATED BOX

Boxes (all-welded construction) are designed for more efficient handling of scrap or forgings for dumping. Slots at sides for rotary dumping operation. Constructed with square corners to insure more interior space and easy stacking. Built to your specifications.



Members of Austrian Sawblades and Machine Knives Productivity Team are shown being addressed by plant officials on the occasion of their recent visit to the Brown & Sharpe Mfg. Co., Providence, Rhode Island.

### Austrian Productivity Team Visits Brown & Sharpe

The Brown & Sharpe Mfg. Co., Providence 1, R. I., was a host recently to seven members of the Austrian Sawblades and Machine Knives Productivity Team visiting numerous metal and woodworking manufacturers' plants throughout the United States. Following a trip through various departments in the plant, the group was entertained with a luncheon at the Sheraton-Biltmore Hotel. During the afternoon, the members of the team were addressed by Wallace B. Bainton,

vice president, Howard L. Merrill, assistant secretary, and other Brown & Sharpe plant officials on various subjects, including manufacturing, quality control, and management. A question and answer period followed.

The visiting Productivity Team comprised the following members: Hans Laizner, engineer; Friedrich Hackenberg, foreman; Rudolph Larisch, technical manager; Karl Friedrich Matysek, technician; Siegfried Plankensteiner, engineer; Rudolph Schmidhuber, owner and manager; and Heinrich Wuester, partner and manager.



## STOP

## Oily Floor Mishaps with FULLER'S EARTH

Avoid costly accidents caused by slipping on oily or greasy floors! Reduce fire hazards! Replace sawdust or wood shavings with Fuller's Earth. Every shop needs this low-priced safety aid. Fuller's Earth *absorbs* oil and grease — and it's non-inflammable. Write for FREE SAMPLE to test.

TAMMS

Dept. RM-9, TAMMS INDUSTRIES, Inc., 228 N. LaSalle Street, Chicago 1

CALL

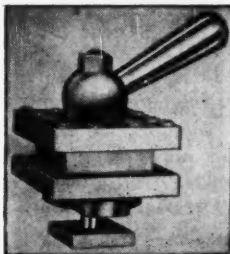
**Sid  
Tool**  
COMPANY
**"HARD TO FIND TOOLS FOR STOCK DELIVERY"**

## ROYAL TOOL POST TURRETS

### WITH 12 POSITION INDEXING

Permit work to be done on ordinary lathes that ordinarily requires a turret lathe. Exceptionally flexible . . . Dependable accuracy maintained in every re-indexed position. Protected against dirt and metal chips. All working parts hardened and rust-proofed. Heavy duty steel construction.

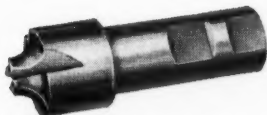
Made in complete size range, 3 models; Finger-tip control; 3 working positions for each tool; indexing in one complete unit. Fully guaranteed!



Dimensions Model No.	Tool Block Specifications	Tool Size Range	Approx. Lathe Swing	Ship. Wght.	Price Each
250	4 tool, 12 position 2 1/2" sq. x 1 3/8" thick	1/4" to 3/8"	Bench Lathes	3 1/2 lbs.	\$27.50
350	4 tool, 12 position 3 1/2" sq. x 1 3/4" thick	3/8" to 1 1/2"	10" to 13"	9 lbs.	\$39.50
450	4 tool, 12 position 4 1/2" sq. x 2 1/4" thick	1/2" to 3/4"	13" to 16"	15 1/2 lbs.	\$59.00

Model 250 available from stock ready for immediate use on Atlas, South Bend and Logan Lathes. Turrets available with a machineable base.

### HIGH SPEED CORNER ROUNDING END MILLS



For use in milling rounded corners, etc. They are of the form relieved type and can be sharpened many times without changing the form.

Radius	Diam. of Shank	Largest Diam.	Whole Length	Net Price Each
1/16	3/8	7/16	2 1/2	\$6.66
3/32	3/8	1/2	2 1/2	6.99
1/8	1/2	3/4	3	8.63
5/32	1/2	3/4	3	9.61
3/16	3/4	1	3 1/8	11.03
1/4	3/4	1	3 1/4	12.01
5/16	7/8	1 1/8	3 1/2	14.09
3/8	7/8	1 1/4	3 3/4	16.28

### DOVETAIL CUTTERS

#### Shank Type — High Speed Steel

Designed to take the place of arbor type and threaded hole angle cutters. Advantageous in reducing set-up time. Ease of handling make them the ideal tool for milling dovetails.

45° and 60° angle R.H. cut are standard. Please specify angle.



Cat. No.	Diam. of Angle Cutter	Diam. of Shank	Over- all Lgth.	Net Price Each
DT-24	45° 3/4	5/16	3/8 2 1/8	\$7.19
DT-44	45° 1 1/8	9/16	3/8 2 1/8	10.57
DT-24A	60° 3/4	5/16	3/8 2 1/8	7.19
DT-44A	60° 1 1/8	9/16	3/8 2 1/8	10.57

**SID TOOL COMPANY, INC.**  
CUTTING TOOL SPECIALISTS  
126 LAFAYETTE STREET • NEW YORK 13, N. Y.

• Are you on our  
monthly mailing  
list? Write us today!

PHONE: BE 3-4270

## S.E.S.A. Annual Meeting and Exhibition

The annual meeting of the Society for Experimental Stress Analysis will be held December 3, 4, and 5 at the Hotel McAlpin, New York, N. Y. An exhibit will be held on December 3 and 4 in connection with this meeting.

Complete details regarding the meeting and exhibition can be obtained by writing to the Society for Experimental Stress Analysis, P. O. Box 168, Center Square Station, Cambridge 39, Massachusetts.

### Arch Morton Resumes Active Management of Morton Machine Works

Arch Morton, head of Morton Machine Works, 2421 Wolcott St., Detroit 23, Mich., after a year's absence has again resumed active management and



Arch Morton (left) and Paul W. Taylor

now supervises all of the company's activities. Mr. Morton has appointed Paul W. Taylor as manager of the company. Mr. Taylor was previously with the Cadillac Tank Plant in Cleveland, Ohio, where he was in charge of the Special Assignment Division. Prior to his Cleveland assignment, he was employed by the Cadillac Motor Car Division home plant. He has had a diversi-

**YOU'VE GOT TO BE SURE OF YOUR HARDNESS  
... INSIST ON CLARK TEST BLOCKS**



Your hardness tester is useful only when you are sure it is giving you accurate, dependable readings. You can rely on the accuracy of your hardness tester when you check it regularly with CLARK standard test blocks. Clark test blocks, in various hardness grades, provide a quick, sure, and simple method of assuring accurate hardness tester readings.

**CLARK**  
TOMORROW'S ACCURACY TODAY  
**CLARK**

**INSTRUMENT, INC.**

10200 Ford Road

Dearborn, Mich.

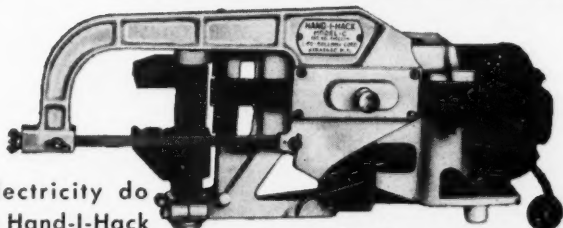
# Goodbye Elbow Grease!

Use

**HAND-I-HACK\***

**Portable**

**POWER HACK SAW**



**TAKE IT EASY**—let electricity do your muscle work! Hand-I-Hack eliminates the sweat and fatigue of hack sawing. Plugs into any wall or light socket. Truly portable — can be carried anywhere with one hand. Has swivel vise — operates in any position: horizontally, vertically, at an angle, even upside down. Maximum capacity: 3" x 3" square cut. Uses lower cost standard 10" hand blades — will cut solid bar stock and thin wall tubing, pipe, conduit, cable, rolled forms, etc.



Cutting small diameter brass tubing, using wood block false jaws.



Making a square cut on solid 3" steel bar.

- Write for catalog and name of dealer



\*T.M. Reg. U.S. Pat. Off.

**Life - ROLLWAY CORPORATION**

Manufacturers of Automotive Clutches and Machine Tools

814 Emerson Ave., Syracuse 1, N. Y.

fied training in parts manufacturing ranging from processing to sales management.

### Seventh Annual Industrial Packaging and Materials Handling Exposition

The importance to top management of scientific protective packaging and materials handling as profit-making functions will be emphasized at the

Seventh Annual Industrial Packaging and Materials Handling Exposition in Chicago's famous Coliseum next October 14, 15, and 16. "Making Profits through Packaging and Materials Handling" will be the theme of the exposition. It will be dramatized in the unique annual Protective Packaging and Materials Handling Competition. It also will underlie the curriculum for the annual "short course in packaging and materials handling," which will be conducted

October 13, 14, 15, and 16 under the sponsorship of the College of Engineering, Department of Mechanical Engineering, University of Illinois—Extension Division, at its "campus" at the Coliseum.

The Industrial Packaging and Materials Handling Exposition and concurrent competition are sponsored annually by the Society of Industrial Packaging and Materials Handling Engineers, whose membership includes many hundreds of the top packaging and materials handling executives of the country's leading industries.



for

• TOOL CRIBS • STOCK ROOMS • MACHINE SHOPS



**Saves Time** hunting through stacks of packaged drills. Compartments hold a gross of small sizes—a dozen or more of the larger ones. Raised letters on easy sliding drawers . . . hammerlin gray baked enamel finish . . . 14½"x7¼"x7¼".

Write  
for  
Circular

Model No. 1: Fractional drills ⅛" to ½"  
Model No. 2: Number drills 1 to 60  
Model No. 3: Letter drills A to Z

**HUOT MFG. CO.**

538 NORTH WHEELER ST.  
ST. PAUL W4, MINNESOTA

"HUOT" is pronounced "HEW-OT"

# Talk About Bargains In Fine Magnetic Chucks L-W HAS THEM!

Supplied with connections for either 110 or 220 volts D.C.

**Grip Work Tightly for Wet or Dry Grinding  
Guaranteed Waterproof**

5 3/4" x 13"

**\$55.37**

6 1/2" x 18"

**\$73.40**

8" x 24"

**\$127.03**

10 3/4" x 37"

**\$234.81**



## DEMAGNETIZERS

A single pass over the stationary poles completely demagnetizes work. 110 volt A.C. Model B-2 for large work, 7 3/4" x 12 1/2" x 6 3/4".

Ship. wt. 55 lbs. **\$73.45**

Model J-1 for small work, 7 1/4" x 7 1/4" x 6 3/4". Ship. wt. 35 lbs.

**\$47.83**

## RECTIFIERS



A.C. input 110 volts. D.C. output 110 volts. P-1 for 5 3/4" x 13" chuck 0.8 amps. **\$45.04**

P-2 for 6 1/2" x 18" chuck 1.0 amps. **\$52.30**

P-3 for 8" x 24", 10 3/4" x 37" chuck 3.0 amps. **\$69.73**

## DEMAGNETIZING SWITCHES



For 5 3/4" x 13" and 6 1/2" x 18" sizes **\$10.35**

Field discharge type for 8" x 24" and 10 3/4" x 37" **\$18.90**

Order from Your Industrial Supply Distributor or Order Direct,  
Giving Name of Your Distributor.

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products



DEMAGNETIZERS



MAGNETIC CHUCKS



DIVIDING HEADS



RECTIFIERS



DEMAGNETIZING SWITCHES



LATHE CHUCKS



UNIVERSAL CHUCKS



POWER RACK SAWS



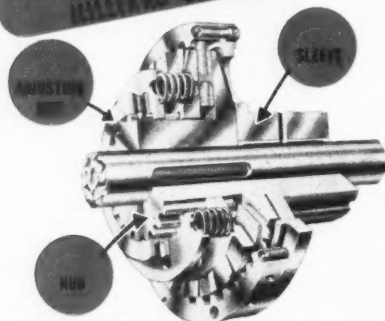
MILLING MACHINE VICES

# L-W CHUCK COMPANY

28 SO. ST. CLAIR ST.  
TOLEDO 4, OHIO

★ **PROTECT YOUR MACHINERY FROM DESTRUCTIVE OVER-LOAD**

★ **IMPROVE THE CONTROL OF YOUR REWIND STAND WITH HILLIARD SLIP CLUTCHES**



#### **REGULAR SERIES**

From 50 inch pounds to 300,000 inch pounds torque. Prevents transmission of over-load. Constant torque clutches can be pre-set. Adjustable while running constant tension clutches. Provide ample friction surface for heavy duty use in reeling and winding operations.

#### **THE NEW LIGHT SERIES**

Here's high capacity in small size. From 10 inch pounds to 500 inch pounds torque. Metallic plates, disc springs. Constant torque—easily adjustable.

• **SAVES MONEY INCREASES PRODUCTION**

FOR DETAILED INFORMATION WRITE FOR BULLETIN 300

**HILLIARD**  
*Slip Clutches*

Also Manufacturers of Over-running and Single Revolution Clutches

Clutch makers for over forty-five years

**THE HILLIARD Corporation**

117 W. FOURTH STREET, ELMIRA, N. Y.

IN CANADA • • UPTON BRADEEN - JAMES LTD.

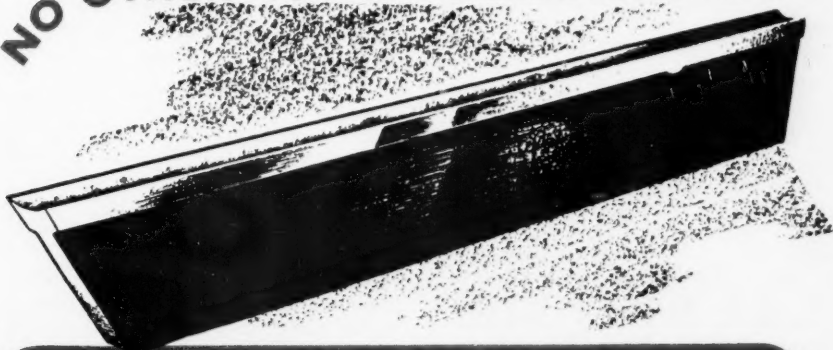
## **\$30,000 Mechanical Design Award Program**

A new competition for designers, engineers, and manufacturers of machinery of all types has been announced by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio. The new Mechanical Design Award Program offers \$30,000 in 101 cash awards, as well as national recognition, for the best papers describing the mechanical design and construction of any type of machine or machine component which is designed for arc welded steel fabrication.

Any machine or component whose performance or appearance has been improved or whose cost has been reduced through the use of arc welding in its construction can be described. Any person who has participated in the designing, planning, or manufacture of the machinery can compete in the program by describing his work. A total of \$20,000 will be given in 54 awards in 18 different divisions comprised of 18 first awards of \$500, 18 second awards of \$250, and 18 third awards of \$100, plus 39 honorable mention awards of \$100. Each division offers separate competition. A total of \$9,900 will be given in grand awards to the eight best-of-the-program papers. All papers are eligible for both divisional and grand awards. The top award is \$2,000, plus the \$500 first division award.

Papers may describe machinery in any of the following 18 classifications: metal cutting; metal forming; electrical; conveying; pumping and compressing; prime moving; jigs, fixtures, and tooling; processing; construction and mining; petroleum and gas; metal making and refining; textile and clothing; farming and ranching; food and

**NO OTHER CUT-OFF BLADE LIKE THIS!**



*None can do what* **EMPIRE'S**  
**Luers Cutting-off Blade**  
*will do*

Empire Tool Co. is the **LEADER** in cut-off blade developments—backed by twenty years' experience in cut-off blade manufacture.

Cut-off blades are tools subject to conditions different from those of other tools and will perform most efficiently only when specialists' recommendations are followed.

Available from stock are blades of four types of high speed steels developed to meet the demands of cut-off operations. And on short notice you can get blades of cast alloys and tungsten carbide.

Made under license issued by John Milton Luers Patents, Inc.

Made in U.S.A.

**EMPIRE**

**8776 GRINNELL AVE.**

**TOOL COMPANY**

**DETROIT 13, MICHIGAN**

fiber products; woodworking, lumbering, and milling; household; printing; and machinery not otherwise classified.

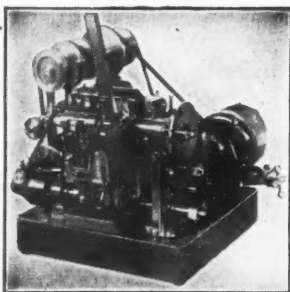
All papers will be judged by a jury of engineers, educators, designers, and fabricators selected from men prominent in industry and education. The program closes July 27, 1953. A Rules and Conditions brochure is available from the Lincoln Foundation, Cleveland 17, Ohio.

## G. & H. INDEXING FIXTURE COLLET TYPE



**MANUAL or  
AIR OPERATED**  
Collet Capacity  $\frac{1}{8}$ "  
to  $1\frac{3}{16}$ ". Indexes  
—2, 3, 4, 6, 8, 12 and  
24 stations. With one  
index plate. Many  
other features.  
Write for Circular

**G. & H. MANUFACTURING CO.**  
327 Elm St. Fitchburg, Mass.



## WALTHAM

### Pinion and Gear Cutting Machines

with revolving cutter will make 1, 2 or 3 successive cuts for watch pinions or may be used for fine pitch gears up to  $1\frac{1}{2}$ " dia. Blanks are held and indexed by work spindle and usually supported by a tail center. Only straight teeth can be cut.

### WALTHAM MACHINE WORKS WALTHAM, MASS.

Pinion and Gear Cutting Machine, Thread Milling Machine, Cylindrical Sub-Presses, Cutter Sharpening Machine, Small thread milling and gear cutters, Small special machinery.

## Vice President of Norton Dies

Wallace Tenney Montague, vice president of Norton Co., Worcester, Mass., died recently at the age of 63.

A director of the Grinding Wheel Institute at the time of his death and former board chairman of both the Grinding Wheel Manufacturers Association and the Abrasive Grain Association, Mr.



Wallace T. Montague

Montague began work for Norton 40 years ago in the research laboratory, entering the sales department in 1914. Two years later he was appointed head of the sales engineering department and became assistant sales manager of the Abrasive Division in 1919. In 1922 he was named assistant sales manager of the Grinding Machine Division and became its sales manager the following year.

From 1929 to 1932 he was assistant general sales manager for the company, after which he served as director of sales of the Abrasive Products Division until 1935 when he was appointed manager of sales planning and development. He was made assistant vice

## AT LAST!

### A Low-Priced Dial Type Indicator

Has 2 contacts  $1/32$ " threaded within  $1/8$ ". Double Faced. Reads front and back. Two Crystals. Double faced dial indicator complete with plated holder including  $1/32$ " and  $1/8$ " contacts—  
Black Penrate — \$6.95  
Satin Chrome — 7.95  
 $1/32$ " Contact,  $1/2$ " long extension — .75



**SUPERIOR INDICATOR CO.**  
P.O. Box 734 Rochester 3, N. Y.

**For Extreme  
Accuracy** →

*You Can Depend on*

# **JOHANSSON GAGING EQUIPMENT**



**It Assures You Precision to the  
Finest Degree, — to Meet Your  
Most Exacting Requirements —**

**Backed by the Name  
Supreme in the World  
of Measurement.**

● **GAGE BLOCKS**

(JOHANSSON) and accessories. Short deliveries. Inspection and reconditioning service available at our plant.

● **INTERNAL INDICATORS**

(or inside measurements .155 to 24 inches) Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001.

● **MIKROKATOR**

(Amplifier — for outside measurements) Graduations .0001 to .000002 or .001 M to .0002 M.

● **OTHER JOHANSSON  
PRODUCTS**

Micrometers, Snap gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators.

*Write for Literature*

**C. E. JOHANSSON GAGE CO.**

8900 ALPINE AVENUE, DETROIT 4, MICHIGAN

A DIVISION OF SWEDISH GAGE CO.

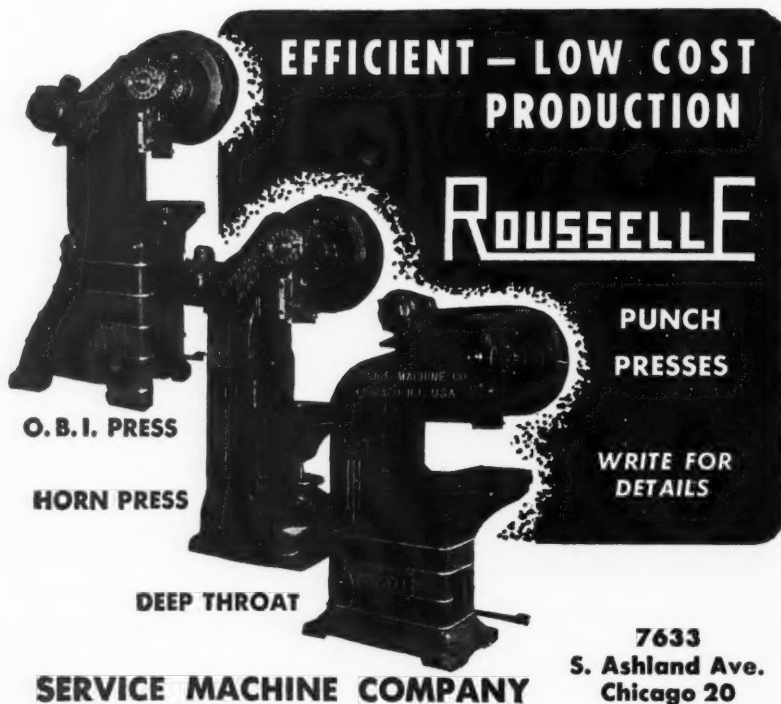
president in 1939, and vice president and manager of business planning and development in 1942—the position he held at the time of his death. Mr. Montague was elected a director in 1946 and at the same time became a member of the company's executive committee.

### **M. E. Cunningham Acquires New Plant**

M. E. Cunningham Company, manufacturer of steel stamps, dies, and other marking tools, has recently acquired a new plant in Pittsburgh. According to Franklin Speicher, Sr., president, the new plant will have more than double the working space than was available in the South Side

Pittsburgh site where the company has been located since 1928. Additional metal-working and heat-treating equipment has been purchased for the new plant to handle increased production.

Established in 1889 as a manufacturer of rubber stamps, the firm gradually concentrated on steel stamps, dies, and special marking tools. Cunningham's products feature "Mecco Safety Steel," a special alloy steel developed for use in marking tools because of its ability to resist dangerous spalling and mushrooming. Officers of the company are Franklin Speicher, Sr., president; Franklin Speicher, Jr., secretary-treasurer; and Walter Speicher, assistant treasurer.



**EFFICIENT — LOW COST  
PRODUCTION**

**ROUSSELLE**

**PUNCH  
PRESSES**

**WRITE FOR  
DETAILS**

**O.B.I. PRESS**

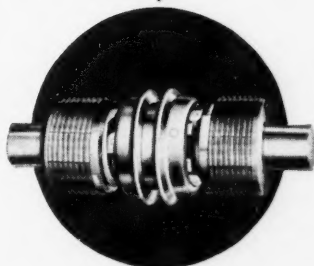
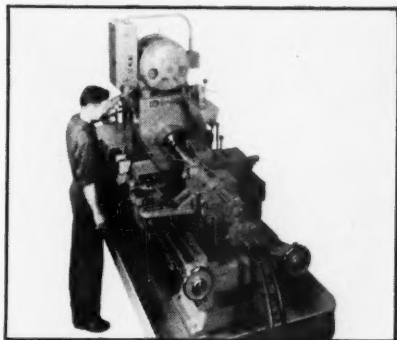
**HORN PRESS**

**DEEP THROAT**

**SERVICE MACHINE COMPANY**

**7633  
S. Ashland Ave.  
Chicago 20**

## This Lathe "Works Both



## Ends Against The Middle"

The Lodge & Shipley DUOMATIC LATHE features independently actuated front and rear carriages and tool slides; permitting simultaneous or independent operation of the front and rear cycles, ROCKFORD CLUTCHES both drive and brake the main headstock drive. Let ROCKFORD clutch engineers help plan versatile power transmission controls for your machines.

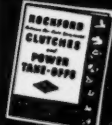
**ROCKFORD CLUTCH DIVISION** BORG-WARNER

300 Catherine Street, Rockford, Illinois, U. S. A.



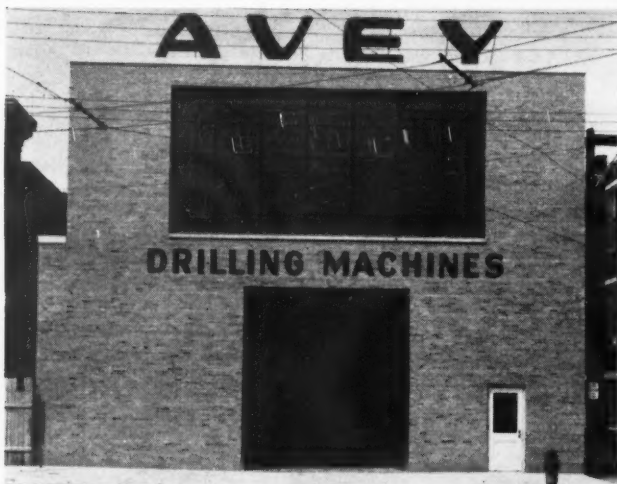
**B-W  
ENGINEERING  
MAKES IT  
WORK**

**B-W  
PRODUCTION  
MAKES IT  
AVAILABLE**



**ENGINEERING  
BULLETIN  
SENT ON  
REQUEST**

# ROCKFORD CLUTCHES



New addition to plant of The Avey Drilling Machine Co., Cincinnati, Ohio

square foot addition to its plant for the purpose of final assembly of special drilling machines. The new addition has a high bay which is approximately 200 feet long and accommodates a 40-foot overhead crane.

**Addition Made to Avey Plant**  
The Avey Drilling Machine Co., Cincinnati 1, Ohio, has completed a 17,000

As shown in the accompanying illustration, the building is of modern fire-proof construction.

## SPECIAL MACHINES

**Built for Drilling, Reaming, Tapping, Boring and Milling**

These units are in use in the largest production plants in the world and give dependable service on every application. The unit is ruggedly built throughout and designed to give years of constant, accurate service.



Drilling, Tapping, Reaming and Chamfering Rocker Arm Shaft



*Lee Engineering Company, Inc.*

4700 BURLINGAME • DETROIT 4, MICHIGAN

*Yes — "2 in 1" filing  
at every stroke!*

*And only Heller Nucut  
gives it to you!*



# HELLER

## NUCUT WAVY TEETH FILE

Reg. U.S. Pat. Off.

Pat. No. 2,027,039

**WITH A NUCUT YOU FILE MORE, FASTER,  
BETTER WITH LESS EFFORT**

Just take a few strokes . . . and you'll prove NUCUT's superior cutting power to your own satisfaction. NUCUT's *two* distinct sets of teeth, scientifically positioned in a patented wavy construction, make the difference.

The coarse teeth cut clean, deep, true—without scraping or skidding. At the same stroke, the fine teeth leave the surface sleek, smooth. There you have it—the fastest, easiest, best filing you've ever seen.

Your distributor has the sizes, shapes and cuts you need.

### HELLER BROTHERS COMPANY

A New Jersey Corporation

America's Oldest File Manufacturer

NEWCOMERTOWN, OHIO

CONTACT YOUR INDUSTRIAL DISTRIBUTOR for our FULL LINE of American Pattern, Swiss Pattern, Milled Curved-Tooth and Rotary Files, Rasps, Machinists' and Carpenters' Hammers, Blacksmiths' and Farriers' Tools, Bricklayers' and Plasterers' Trowels, Craftmaster Scrapers, Chisels, Punches, Masterrenches and other quality tools.

Cash in  
on the file  
with the  
WHITE TANG

## Metal-Working News in Brief

The Fellows Gear Shaper Co., Springfield, Vt., has announced that **George H. Sanborn**, Detroit district manager and chief field engineer, has been named sales manager to succeed **Leroy C. King**, who retired after 41 years in service and sales work for the company. **Henry B. Flinn**, assistant publicity manager, has been appointed

publicity manager, succeeding **Douglas T. Hamilton** who retired after serving 35 years in that capacity.

— o —

**Brown-Warrick Co.**, 1097 Cannon St., E. Hamilton, Ontario, is now representing the Detroit Die Set Corp., Detroit, Mich., in Canada on the Niagara peninsula and in the area from Toronto-Oshawa to London-St. Thomas, carrying a complete stock of fac-

tory - assembled and tested standard "Detroit" die sets and accessories and also handling orders for special die sets.

— o —

**Herbert Schwartz**, formerly assistant to the general manager, has been appointed production manager of Daco Machine & Tool Co., Brooklyn, N. Y., manufacturer of aircraft precision instruments and specialist in instrument tooling programs.

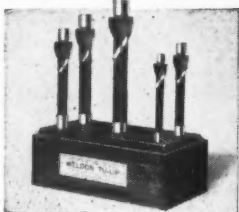
— o —

**Timken Roller Bearing Co.**, Canton 6, Ohio, has elected **John A. Riley** to the post of secretary and treasurer, succeeding the late **R. C. Brower**.

YESTERDAY'S PIONEER . . . TODAY'S LEADER

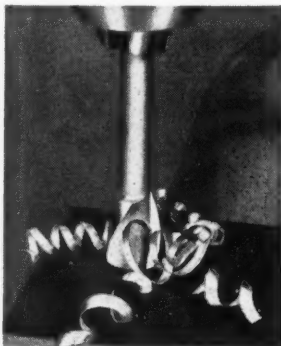
## WELDON "TU-LIP" COUNTERBORES

For FAST, FREE  
CUTTING



As the name implies, WELDON "Tu-Lip" counterbores have only two cutting lips or flutes. This feature, together with the fast spiral, makes the "Tu-Lip" the fastest, freest cutting counterbore on the market.

Breakage due to clogging is prevented because this improved cutting tool provides more than ample chip room. Furnished singly in sizes desired or in convenient wood block sets as illustrated.



Weldon distributors throughout U. S. A. and Canada  
carry complete stocks to serve you.

WRITE FOR LATEST CATALOG NO. 10.

**THE WELDON TOOL CO.**



3000 WOODHILL ROAD

*Cleveland 4,  
Ohio*

**For Holding**

**SMALL** →

**MEDIUM or** →

**LARGE PARTS** →

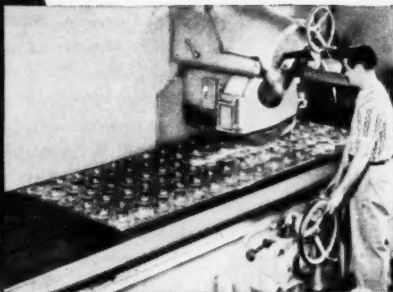
## Use Sundstrand Magnetic Chucks

Here's another interesting application of magnetic holding applied to a surface grinder. The deep penetrating power of the Sundstrand magnetic chucks makes it possible to hold a great number of small parts or large castings. In all cases setup is simplified and clamping time is greatly reduced.

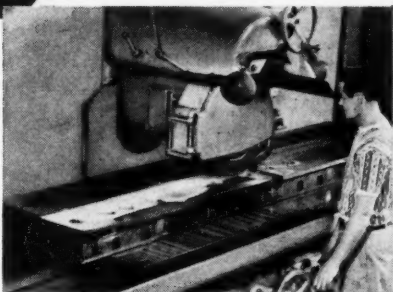
Whether you have tool room, production, or special holding problems, look into the possibilities of eliminating expensive clamping and increasing production with Sundstrand Magnetic Chucks.

## Get All the Facts

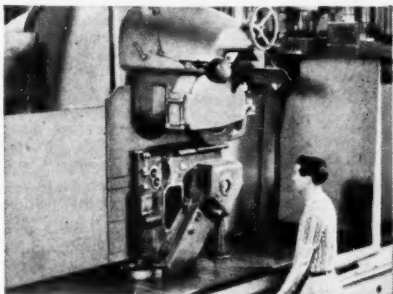
Write for complete information on these time saving magnetic chucks. Ask for bulletin 523M.



Grinding a load of 102 gears.



Grinding four slide castings.



Grinding drill press frame



**SUNDSTRAND**  
**Magnetic Products Co.**

Division of Sundstrand Machine Tool Co.  
1020-9th ST. • ROCKFORD, ILLINOIS

## Metal-Working News in Brief

Carboly Department of General Electric Co., Detroit 32, Mich., manufacturer of specialized metals and cemented carbide tools for the metal-working industry, has announced the following appointments: **E. R. Almdale** as manager of the Atlantic district with headquarters at 1060 Broad St., Newark 2, N. J.; **Robert Grorud** as Al-

nico specialist with headquarters at 844 S. Canal St., Chicago, Ill.; **V. H. Dearle** as manager of the Michigan district with headquarters at 11177 E. 8 Mile Rd., Detroit; **Squier, Schilling and Skiff, Inc.**, 415 Plane St., Newark 2, N. J., as an additional distributor for 13 counties in the northern New Jersey trade area; and **Acme Saw & Supply**, 2745 Kettner Blvd., San Diego 1, Calif., as a distributor for San Diego

and Imperial counties in southern California.

— o —

**The Syntron Chicago Sales Company**, who represents and sells Syntron vibratory material handling equipment, power tools, selenium rectifiers, paper joggers, shaft seals, and so on, in the Chicago area, has announced the opening of a new store at 236 N. Crawford Ave., Chicago 24, Illinois.

— o —

The **R. K. LeBlond Machine Tool Co.**, Cincinnati, Ohio has announced the appointment of **C. J. Harter, Machinery** as sales representative for the Houston, Dallas and Fort Worth areas.

# IDEAL production speed-ups



### LIVE CENTERS

Run lathes faster—make deeper cuts. No gouging, burning or spoilage. Highest accuracy. Male, Female and Pipe points. Also Heavy Duty Models.

### ELECTRIC ETCHERS

Easy as using a pencil to etch iron, steel or their alloys. Burns smooth, permanent mark. Ends cost and delay of special name plates. Safe, portable—3 models.

### DEMAGNETIZERS

Demagnetize tools, punches, dies, drills, work from magnetic chucks. Prolongs tool life. Three models.

### ELECTRIC TACHOMETERS

Quick, convenient. Two sizes—2500 and 5000 RPM.

### "XPAND-O-LAP"

Self-aligning, self-expanding laps.

Sold Through  
America's  
Leading  
Distributors

FREE  
CATALOGS

**IDEAL INDUSTRIES, Inc.**  
1031 Park. Ave.  
Sycamore, Ill.

Please send catalogs on items checked:

- |  |  |
|--|--|
| <input type="checkbox"/> LIVE CENTERS  | <input type="checkbox"/> TACHOMETERS   |
| <input type="checkbox"/> ETCHERS       | <input type="checkbox"/> "XPAND-O-LAP" |
| <input type="checkbox"/> DEMAGNETIZERS |  |

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



**Jigs and Fixtures  
that are easier to  
handle increase  
production. Alcoa  
Cast Aluminum  
Tool and Jig Plate  
is lighter...easier  
to machine. And  
is available for  
immediate delivery\***

- ▶ **Moderately Priced.**
- ▶ **Easy to Machine**
- ▶ **Normalized...Strain Relieved**
- ▶ **Tolerances on Plates of thicknesses  
from 1/2" to 4", held within  $\pm .010$ "**
- ▶ **Widths and lengths: cut to any desired  
dimensions up to 48" x 96"**

*\*For more information on Alcoa  
Tool and Jig Plate, contact your  
local Alcoa sales office... or  
Aluminum Company of America,  
1950- J Gulf Bldg., Pittsburgh, Pa.*

**ALCOA**



**TOOL AND JIG PLATE**

### Metal-Working News in Brief

The appointment of **Karl D. Jahnke** as credit manager and assistant secretary-treasurer has been announced by Dodge Mfg. Corp., Mishawaka, Ind., manufacturers of power transmission machinery.

— o —

The **Burpee Can Sealer Co.**, Barrington, Ill., has purchased the **E-Z Way Tool Co.**, Chicago, and has transferred

all manufacturing operations for the **E-Z Way** electric hack saw to the **Burpee** plant.

— o —

**B. N. Brockman, Jr.**, formerly with The R. K. LeBlond Machine Tool Company of Cincinnati, is now associated with C. J. Harter, Machinery of Houston, Dallas and Fort Worth, Texas.

— o —

**Stanley C. Johnson** has been appointed chief abrasive inspector for the Norton Co., Worcester 6, Mass., replacing **Harry O. Anderson** who retired recently after 51 years with the company.

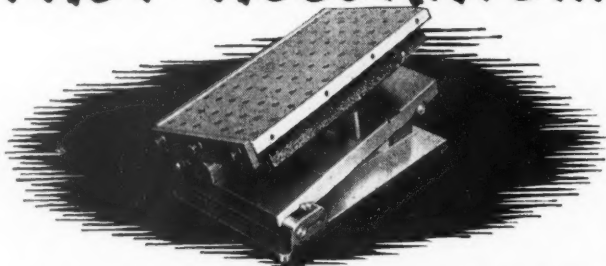
— o —

**Charles Carl Carr**, who retired in 1949 as director of public relations and advertising for Aluminum Company of America, Pittsburgh 19, Pa., died recently of a heart attack in St. Petersburg, Florida, where he has resided since retiring from Alcoa.

— o —

**Malcolm Roberts** has recently joined the Cleveland office of the Machine Tool Division, Kurt Orban Co., Inc., New York 17, New York.

## FAST-ACCURATE...



## ANGULAR INSPECTION SET-UPS



SEND FOR  
CATALOG

Now angular inspection set-ups as accurate as the measuring instruments used can be made in a few moments. Any angle, single or compound, is set up by inserting standard gauge blocks between the Sine-Plate plates. Proper size blocks are indicated for all angles in table supplied. Saves hours of set-up time, guarantees accurate inspection. In two sizes; also magnetic models for machining operations.



**OMER E. Robbins COMPANY**

Manufacturers of the MAGNA-SINE and Other Precision Tools

5722 TWELFTH ST. • DETROIT 8, MICH.



**PRODUCTION  
EFFICIENCY**

# the easy way

Here's how to get efficient metal-cutting the *easy way*: Tell your supplier you want **VICTOR** hand and power hacksaw blades and flexible-back band saws, the brand most people buy.

Then ask him for a supply of **VICTOR Metal-cutting Booklets**—full of timely, authoritative information on the selection, use and care of *any* blades, full of handy hints on fast, efficient metal-cutting.

That's all there is to getting metal-cutting efficiency the easy way.



Sold  
only  
through  
recognized  
distributors

**VICTOR**

SAW WORKS, INC. • MIDDLETOWN, N.Y., U.S.A.

Makers of Hand and Power Hack Saw Blades, Frames and Metal Cutting Band Saw Blades

⊕ 1080A

September, 1952

MODERN MACHINE SHOP 329

## Metal-Working News in Brief

**R. R. Roberts** has been named manager-finance of the Carbology Department, General Electric Co., Detroit 32, Mich., manufacturer of specialized metals and cemented carbide tools. Mr. Roberts replaces **S. B. Strom** who has been appointed manager-finance for the Components Products Division, Fort Wayne, Indiana.

**Donald L. Shephard**, president of Empire Tool Co., Detroit 13, Mich., has announced the appointment of **C. R. Bucciero** as treasurer and **Donald H. Gaines** as secretary of the company.

— o —

The appointment of **Donald R. Guthrie** as executive engineer in charge of engineering research has been announced by Minnesota Mining & Mfg. Co., St. Paul 6, Minn. Mr. Guthrie will

organize a research group for chemical engineering, machine development, and instrument engineering.

— o —

**Robert E. Sibley** retired recently after 45 years as sales and advertising manager of Leiman Bros., Inc., Newark, N. J., manufacturer of air pumps, sandblasting, polishing and dust collecting equipment.

— o —

**Ampeco Metal, Inc.**, Milwaukee, Wis., has announced the appointment of **H. J. Shockey & Associates**, 294 Commercial Bldg., Dayton 2, Ohio, as distributor of Ampeco resistance welding products.



**FOR PRECISION**  
**Carbide Finishing**  
**ELGIN DIAMOND**  
**IN DYMO-C**

*...Designed for Carbides!*

Where precision really counts, finishers specify ELGIN Diamond because they can be sure of:

- constant accuracy—uniform cutting action
- flawless finishes every time, in less time

Actual field tests prove this new diamond abrasive up to 20% faster for finishing carbides.

Send for the DYMO-C bulletin today!

**ABRASIVES DIVISION, Dept. E**  
**ELGIN NATIONAL WATCH COMPANY**  
**ELGIN, ILLINOIS**



OIL BY-PASS

## RELIEF VALVES

### NEED NO MAINTENANCE

Precision-engineered to maintain pre-determined pressures on . . . ram presses, machine tool hydraulic mechanisms, Diesel and oil-burning equipment.

Trouble-free.

Engineered for dependable, quiet, constant performance.

**NON-CHATTERING . . .  
no pounding noise.**

TODAY...write for your personal, professional edition (use letterhead, please) of

**FULFLO  
MECHANICAL  
DATA  
BOOK.**



**BRASS OR  
CAST IRON**  
For pressures  
from 0 to 500  
lbs.  
Pipe sizes:  
 $\frac{1}{4}$ " to 2".  
Standard or  
flange types.



**THE FULFLO SPECIALTIES CO. Inc.**  
BLANCHESTER, OHIO

## Metal-Working News in Brief

Wallace E. Anderson has been promoted to division superintendent of the newly created Precision Tool & Gage Division, Brown & Sharpe Mfg. Co., Providence 1, R. I., and will assume charge of the development and manufacture of precision tools. Samuel H. Waughtel, Jr., has been named division foreman under Mr. Anderson.

G. T. Van Alstyne has been appointed director of advertising and publicity of Air Reduction Co., Inc., New York 17, N. Y. George M. Worden, recently with Hill and Knowlton, Inc. has rejoined Air Reduction as assistant to the director.

— o —

Howard B. Carroll has been appointed assistant sales manager for Sheldon Machine Co., Inc., Chicago 41, Ill., manufacturer of metal-working lathes, milling machines, and shapers. Mr. Carroll was formerly with the Ford Motor company.

— o —

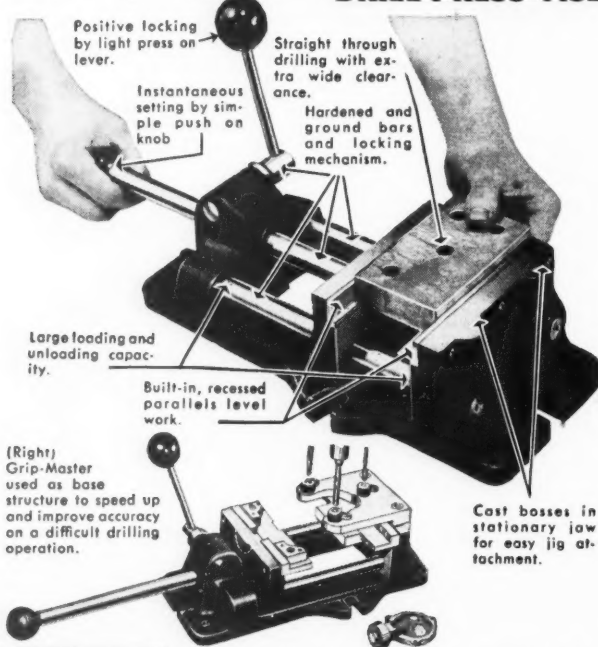
George K. Cassidy, formerly assistant to the sales manager, has been appointed assistant general sales manager of Giddings & Lewis Machine Tool Co., Fond du Lac, Wisconsin.

— o —

Paul B. Foxwell has been appointed abrasive engineer for Norton Co., Worcester, Mass. Mr. Foxwell will reside in Kansas City, Mo., and cover the western Missouri, eastern Kansas, and Oklahoma areas.

## Speed-up DRILL PRESS OPERATIONS

WITH THE HEINRICH *Grip-Master* SCREWLESS DRILL PRESS VISE



(Right) Grip-Master used as base structure to speed up and improve accuracy on a difficult drilling operation.

Cast bosses in stationary jaw for easy jig attachment.

Ask your dealer for demonstration or write for details.

**NATIONAL MACHINE TOOL CO.**  
DEPT. 112-J  
**RACINE, WISCONSIN**

## Metal-Working News in Brief

The Hevi Duty Electric Co., Milwaukee 1, Wis., has transferred **Robert A. Foley** from the eastern district office in New Jersey to the Chicago office. **Robert M. Palmer** has replaced Mr. Foley as district manager of the eastern district. **George M. Brown** has been appointed district manager of the Cleveland district, and **Robert L. King** has been appointed sales engineer in Cleveland. **Elton E. Staples**, vice president in charge of sales, has moved his headquarters from Cleveland to the firm's main office in Milwaukee.

— o —

**Raybestos-Manhattan, Inc.**, Passiac, N. J., has announced the opening of a new Houston warehouse at 3012 Canal Street for servicing the expanding Gulf Coast industrial area. The warehouse, which will carry conveyor belting, transmission belting, V-belts, industrial hose of all types, and asbestos and rubber packings, will operate under the direction of

**M. C. Nugent**. The company also has announced the appointment of the **Webster-Robinson Machinery & Supply Company, Inc.**, as a new distributor in the Tacoma, Washington area.

— o —

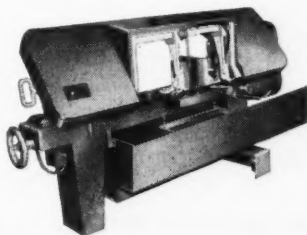
**Roger Magoun** has been appointed economist for Norton Co., Worcester, Mass., succeeding **Stephen P. Foster** who recently retired.



**You can  
CHANGE  
BLADES  
FASTER**

*Kalamazoo*  
**METAL CUTTING BAND SAWS**

No stooping, no fumbling... just swing saw cover open and everything is at your fingertip. Release blade tension, remove blade, insert new one and tighten. It's as simple as that! Result? Minimum loss of time, less chance of damage to blade and of injury to operator.



This is but one of many exclusive Kalamazoo features that add up to lowest cost intermittent or continuous cutting. It will pay you to specify Kalamazoo Metal Cutting Band Saws... three sizes, available with coolant system and casters.

MACHINE TOOL DIVISION

*Kalamazoo* **TANK and SILO CO.**  
**910 HARRISON ST., KALAMAZOO, MICHIGAN**

## Metal-Working News in Brief

Cullman Wheel Co., Chicago, Ill., manufacturer of roller chain, sprockets, and kindred power-transmission units, has promoted **Thomas A. Harvey** to western regional manager covering the states of California, Arizona, and Nevada, with headquarters located at 418 N. Glendale Ave., Glendale 6, California.

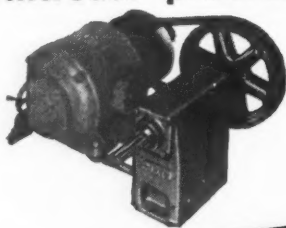
**Kurt Orban Co., Inc.**, 205 E. 42nd St., New York 17, N. Y., has been appointed exclusive American distributor for **Schiess A. G.**, Duesseldorf, Germany, builder of heavy machine tools, such as vertical boring mills up to 84-foot turning diameter; vertical turret lathes up to 71-inch diameter; horizontal boring and milling machines up to 12 $\frac{3}{8}$ -inch spindle diameter; gear hobbors for cutting gears up

to 23-foot diameter and larger; crankshaft turning machines with internal turning diameter to 112 inches; and locomotive tire lathes with capacity for boring internal diameters up to 88 $\frac{1}{2}$  inches.

— o —

**Frederick G. Rahe** has been appointed sales manager for the Butterfield Division, Union Twist Drill Co., Derby Line, Vt., manufacturer of twist drills, taps, dies, reamers, and other metal cutting tools. Mr. Rahe will cover the metropolitan New York and New Jersey areas, making his headquarters at 28-30 Park Place, New York City.

**Increase production . . . lower  
operating costs**



*with  
finger tip  
control*

# LOVEJOY

**variable  
SPEED PULLEYS**

A mere turn of the hand is all that is required for instant speed correction on your machinery. Changes in production schedules, operator speed adjustment or specification variations are accomplished without loss of time or labor. Benefits of LOVEJOY finger-tip-control pulleys are reflected in an improved product—manufactured at a lower cost. Sizes from fractional to 8 hp. Ratios to 3 to 1.



Get full information on this complete line of economical variable-speed pulleys. Write today for fully illustrated catalog and engineering manual.

**LOVEJOY FLEXIBLE COUPLING CO.**

5007 W. Lake Street

Chicago 44, Illinois

Also Mfrs. Lovejoy Universal Joints and Lovejoy Flexible Couplings

## MAKE 3 HAMMERS

AT ONCE



Mold your own  
Lead Hammers  
on a PRODUCTION SCALE  
with a Shur-Grip  
Handle and

Cook Production Mold. Write  
for Circular.  
Vises, Hammer Molds, Handles

**LAWRENCE H. COOK, INC.**

67 Massasoit Ave. E. Providence 14, R. I.

## C A M S

We are fully equipped to **GRIND OR MILL**  
a complete range of CAMS to your specifications on our **ROWBOTTOM** Cam Milling  
Machines.

Your inquiries answered promptly.

**HIMOFF MACHINE CO., INC.**

23-16 44th Road Long Island City 1, N. Y.

## MARK IRON, STEEL and CARBIDES



THE  
*Etchograph*  
WAY

Original Electric Etcher, Thousands in Daily Use  
Mark hardened parts, tools, dies, gages  
and fixtures of any ferrous metals including  
the hardest alloys and carbides—  
quickly—plainly. • Three sizes to meet  
all requirements.

• Write for circulars and prices.

**BREWSTER-SQUIRES CO.**

P. O. Box 191

Tenafly, N. J.



## A FEW "POINTS" TO REMEMBER

When in need of the best in Carbide tools remember to specify "NORTH-WEST"!

Tips are full-sized, uniformly brazed, have sturdy shanks and diamond ground cutting edges. Tipped with Carboloy cemented Carbide.

LOOK  
for this  
mark of  
quality



Consistent  
performance  
regrind  
after  
regrind!



Precision built  
flat, single point,  
carbide cutting  
tools.

Carbide cutting  
tools made to  
your own specifications. Distributors in all leading cities.

A complete line  
of Standard Carbide cutting,  
turning and boring  
tools.

Write for catalog.

**THE NORTH-WEST TOOL COMPANY, 8 North Kilmer St., Dayton 7, Ohio**

## guest editorial



### The Fruits Of Success

By BENJAMIN F. FAIRLESS

Business success is like happiness . . . you can gain it only by giving it. I do not know how any honest business can prosper without adding to the prosperity and welfare of our whole society; nor do I know of any lawful enterprise that has ever achieved success without contributing to the success of others.

By being successful, our industries have created new products, new wealth, new jobs and new purchasing power for our whole national economy. Thus success has brought new prosperity and new security, and a new measure of health and comfort, to an entire nation.

That is the real meaning of success. Like trees in an orchard, our productive enterprises have grown in size and in strength. They have gained all the nourishment which was required for their own growth, but their fruits have helped others to grow too. And by bearing these fruits they have encouraged everyone to plant more trees.

All of us recognize the importance of new and small business to our national economy. When any nation stops producing new business units, it must perish just as surely as it would if it had stopped producing children. The trouble is that the establishment of any new business is likely to be a very hazardous and costly gam-

ble. Yet the whole future of America depends on the willingness of millions of people to take that risk.

Somewhere in America, this very day, nearly thirteen hundred brand new businesses are opening their doors to the public for the first time. Another thirteen hundred will do so tomorrow, and so it will be the next day — and every weekday throughout the entire year.

Experience tells us, unhappily, that most of these brave new ventures will fail, and yet — knowing this — their owners have still been willing to risk their precious savings, and to mortgage, perhaps, their entire future, on the outside chance of success. Why?

First, because they have seen others take the same gamble and win; and second, because they hope — if they win — to win big. If they thought for a minute that the best they could expect of the business was that it would remain small, provide a hand-to-mouth existence, and keep one jump ahead of the sheriff, not one of these ventures would have seen the light of day.

Growth and progress are something more than the mere symptoms of success . . . they are the necessary ingredients of it; and when any company, big or small, stops growing and ceases to progress, you can be sure that the rigor mortis of business failure has set in.

## RECLINABLE POWER PRESSES



Ideal for general stamping work . . . 4 to 100 tons capacity. Can recline to 40° with perfect safety.

Our catalog contains a wide variety of press types and sizes. Write for it today.

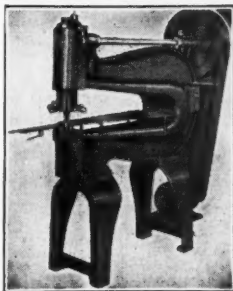
\* 48th year serving worldwide industry with Patent Percussion, Open Back, Double Crank, Punch, Horn, and Toggle and Straight Side Presses, Dial and Roll Feeds.

**ZEH & HAHNEMANN CO.**

190 VANDERPOOL ST.,

NEWARK 5, N. J.

## SAVAGE NIBBLING MACHINES



CAPACITIES  
UP TO AND  
INCLUDING 3/4"  
MILD STEEL

—  
ASK FOR  
FREE BULLETIN  
"I"  
—

"NIBBLE YOUR COSTS"

FOR TUBE SLOTTING, TUBE SHAPING  
AND CUTTING FLAT SHEETS BY  
TEMPLATE OR TO A SCRIBED LINE.

**W. J. SAVAGE COMPANY**

Knoxville

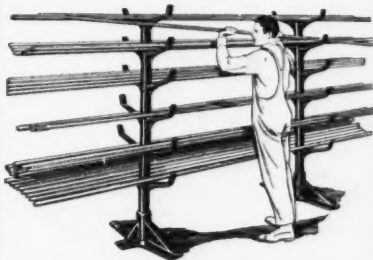
Since 1885

Tennessee

PIONEER MFRS. OF NIBBLING MACHINES

## SPEEDS UP STOCK-ROOM SERVICE

The BROWN SECTIONAL RACK saves the time previously lost in end-hauling each bar of stock its entire length from the old-style, closed-side Rack, the Brown Rack requiring but a few inches of side movement. Each length, width and thickness of stock is displayed in gold-fish visibility for instant selection. Workmen waiting for stock are served without waste of time.



Any time you require additional storage space, all you need do is add more units. If you want to relocate it at any time, you can do so quickly for it is unattached to the building.

It is a simple, durable article made of metal in five styles. It can't burn, warp, sag or twist; depreciation is practically nil. SEND FOR BULLETIN No. 26-B DESCRIBING

BROWN'S *QUICK-SERVE* RACKS

**BROWN ENGINEERING CO.**

120 N. THIRD ST. READING, PA.

RACKS • VISES • CLUTCHES • COUPLINGS

# Book reviews

**The Measurement and Control of Temperatures in Industry.** By R. Royds. Published by Chemical Publish-

ing Co., Inc., 212 5th Ave., New York 10, N. Y. 260 pages. Illustrated. Cloth binding, board covers. Price, \$5.00.

This volume covers the latest developments in temperature measurement and control to help the metal, chemical, petroleum, and other industries in maintaining the highest possible thermal efficiency. The various methods and equipment which are avail-

able for the measurement of temperatures in each particular range are discussed. Considerable space is devoted to the standardization and automatic control of temperatures in industry. Attention is given to improving the quality and reliability of industrial products; obtaining an increased rate of production; and effecting the saving of fuel and labor by means of the application of automatic temperature controls.

Included in the book are 116 illustrations — among them many interesting graphs — tables and numerous equations for calculating results.

See  
Us  
at  
Booth  
No.  
1134  
Metals  
Show—  
  
Oct.  
20 - 24.

## LET'S TALK FACTS ABOUT FACE MILLS!

"This NELCO solid-brazed, carbide tipped mill is the best tool we've got. We get the most for our money — it's solid, rugged and dependable . . . gives better finishes, higher table feeds and turns out more work between grinds. Boy! It's a Honey!"



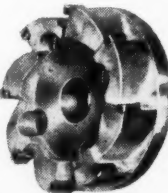
**HERE'S WHY . . .** 2 or 3 solid-brazed face mills cost less than 1 inserted blade type! The same initial investment provides 1 or 2 spare cutters which can be used for production while grinding the original.

There's less chance of damaging rugged, one-piece solid-brazed type cutters. No moving parts to keep aligned! . . . No loose parts to shatter, to injure workers when accidents occur.

A SOLID tool has to work to closer tolerances! It's fact.

### THESE ARE FACTS!...

Solid-brazed cutters can be repaired quickly when damaged — No costly machined body to be re-worked or replaced. 1 blade for an inserted type cutter costs as much as 3 to 5 replaceable solid carbide cutter tips. The solid-type face mill has up to twice as much usable carbide. THEREFORE — SOLID-BRAZED FACE MILLS GIVE YOU — MUCH LOWER INITIAL COST — LOWER MAINTENANCE COST — FASTER PRODUCTION — CLOSER TOLERANCES — GREATER SAFETY and LESS DOWN TIME!



# NELCO TOOLS

*For that Extra  
Edge in Production*

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

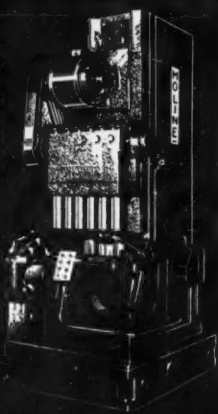
**EISLER CAM MILLING**  
**JIG BORING**  
 A SPECIALIZED CAM  
 MILLING SERVICE...  
 JIG BORING...SPOT  
 WELDING...CON-  
 TRACT PRODUCTION  
 ...EXPERIMENTAL DEVELOPMENT  
**EISLER ENGINEERING CO., Inc.**  
 734 So. 13th St. Newark 3, N. J.



**T-NUTS**  
**STUD SETS**  
**STRAP CLAMPS**  
**SURE GRIP STEP BLOCKS**  
**TIETZMANN TOOL CORP.**  
 ENGLEWOOD, OHIO



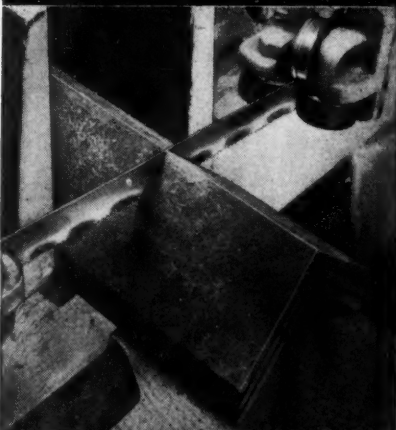
**FOR OVER**  
**50 YEARS**  
**MOLINE**  
**"Hole-Hog"**  
**SPECIALLY**  
**DESIGNED**  
**MACHINE**  
**TOOLS**  
 HAVE CUT PRO-  
 Duction COSTS  
 FOR AMERICAN  
 INDUSTRY



**MOLINE**  
**TOOL CO.**  
 Moline, Illinois

DRILLING  
 BORING  
 HONING  
 TAPPING and  
 Special Machines

**CONSTANT PROGRESS**  
*Your Guarantee of*  
**TOP PERFORMANCE**



In our fully equipped laboratories and testing department, a continuous program of research and development has resulted in the constant improvement of MILFORD Metal Cutting Saw Blades. Among many other advancements, MILFORD originated the fast-cutting Wavy Set Blade and was the originator of the narrow Profile Saw. Important contributions to high speed steel hack saw metallurgy have been and are being made. The time and temper saving Easy-Starting Teeth for hand hack saws are an exclusive MILFORD feature. Always first to bring you the newest in significant metal cutting improvements, MILFORD is the logical choice for top performance.

STANDARD OF QUALITY THE WORLD OVER

**THE HENRY G. THOMPSON & SON CO.**



SAW BLADE SPECIALISTS  
 FOR OVER 75 YEARS  
 NEW HAVEN 5, CONNECTICUT

PROFILE AND BAND SAW BLADES  
 HAND AND POWER HACK SAW BLADES

**The Development of Executive Talent.** Edited by M. Joseph Dooher and Vivienne Marquis. Published by American Management Association, 330 W. 42nd St., New York 36, N. Y. Price, \$6.75 to non-members; \$5.75 to members.

A complete and authoritative company guide to executive training and management development, this book is designed to meet the needs of any company contemplating the introduction of a program of executive development

for the first time, or desiring to improve its present program. The main body of the book is divided into nine parts, consisting of 50 chapters, including an appendix and a bibliography. Subjects covered include: setting up the program—basic principles and practices; organization planning; putting the program into action; special approaches, techniques and programs; getting results from follow-up counseling; program evaluation; trends in management; and case studies of representative companies.

A working blueprint of the principles and tested practices underlying sound executive training and management development for all sizes and types of companies, the book contains specific, practical guidance on all the problems involved at every stage of planning and administration — from the analysis of needs, through the discovery of latent executive ability, to the inventorying, rating and development of executive skills. Forty-four authors contributed to the compilation.

# BARNES

Exclusive

GRADIENT  
HARDNESS

GIVES YOU THE

## ROCKET

**POWER and HAND BLADES**  
HIGH SPEED STEEL



FOR  
ALL-PURPOSE  
CUTTING

**TOUGH! SAFE! FLEXIBLE!**

### W. O. BARNES CO., INC.

DETROIT 14, MICHIGAN

**REID** *One Source for...*

 **Threaded Plastic Balls**  
Oval or Round

 **Clamping Handles**

 **Cast Iron Hand Knobs, Three Styles**

**Machine Handles**  
Straight, Crank and Offset 

 **Hand Wheels**  
Straight or Dished

ALSO SCREW CLAMPS, MACHINE VISES, FIXTURE UNITS, MAGNETIC BLOCKS AND ROTARY TABLES.

*Write for Catalog and Prices on Complete Reid Line*

**REID TOOL SUPPLY CO.**  
709 BAKER ST. MUSKEGON HTS., MICH.

**ALLIGATOR**  
 **FILES**

Over 4,000 shapes, cuts and sizes of both Swiss and American patterns.

Get all your files from one source.  
*Write for new catalog.*

**Carson - Newton Co.**  
61-71 MILL ST.  
BELLEVILLE, NEW JERSEY



**...precision performance-ALWAYS!**

**Falls ROTO CENTER**



for  
lathe and grinder  
tail stocks

Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.



FREE BULLETIN 105  
"What you should know about LIVE CENTERS"

**FALLS PRODUCTS, INC., 124 Genoa Street, GENOA, ILL., U.S.A.**

### Design and Use of Cutting Tools.

By Leo J. St. Clair. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. 437 pages. Illustrated. Cloth binding. Price, \$7.00.

A highly practical treatment of the many problems involved in selecting, designing, grinding, and using machine cutting tools, this book, which is written in easy-to-understand shopman language, shows how to use cutting

tools more efficiently and economically while constantly turning out better work. The book provides helpful information for reducing wasteful tool breakage, reducing expensive tool inventory, and increasing machine output. Functions of the various tool angles—side and end relief, angle of clearance, side and back rake—are treated in detail to aid the reader in designing better tools. Good and poor

qualities of different tool materials are outlined. Chip formation and chip control, as well as ways of maintaining an efficient cutting edge, are thoroughly discussed. In addition, considerable material is provided on grinding tools and selecting the most efficient cutting speeds and feeds.

For "tough" machining jobs, the book presents more than 50 ideas for increasing tool life and over 20 hints for strengthening the cutting edge of the tool. Well over 200 illustrations, charts, and tables make the book easy to follow and provide valuable data in convenient form.

## This DELTA 14-inch Drill Press

**IS SCORES OF  
MAINTENANCE TOOLS  
IN ONE**

Here's a machine that pays for itself very quickly by doing a wide variety of woodworking operations, in addition to drilling. You can do sanding, routing, shaping, mortising, tapping and many others. Ideal for metalworking, too—capacity is  $\frac{3}{8}$ " in steel,  $\frac{1}{2}$ " in cast iron.

With the exclusive Delta interchangeable spindle, the cutting tool can be changed in seconds.

The Delta 14" drill press is easily portable—bring the tool to the job or the job to the tool.

Send for the Delta AB-51 Catalog with full specifications covering all Delta drill presses.

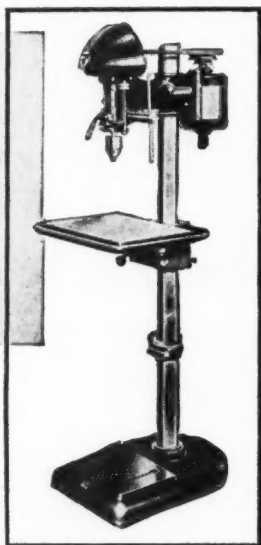
*There's a Delta Power Tool for Your Job*—Wood or Metal Working  
53 MACHINES — 246 MODELS — MORE THAN 1300 ACCESSORIES

**DELTA**  
MILWAUKEE



**DELTA POWER TOOL DIVISION**  
**Rockwell** MANUFACTURING COMPANY

606K N. LEXINGTON AVE. • PITTSBURGH 8, PA.



**BREMIL**  
The IMPROVED Compound Lever Shears

ALL ALLOY  
FULLY  
GUARANTEED



Two Sizes

PORTABLE  
No. 1 cuts up to No. 11 gauge strip or sheet.  
No. 2 cuts up to 1/4" steel plate.

**BREMIL MFG. CO.**  
1400 Pittsburgh Ave., Erie, Pa.

# CAMS

Our ROWBOTTOM cam cutting facilities are at your disposal for your cam requirements.

We Solicit Your Inquiries.

**BLOOMFIELD TOOL CORP.**  
37 FARRAND ST. BLOOMFIELD, N. J.

STEEL  
**Stanho**  
PRODUCTS

## MACHINE KEYS

ALL TYPES

Woodruff Keys Machine Rack  
Taper Pins • Straight Pins  
Cotter Pins and Other  
"Stanho" Steel Products



PRECISION M-2 ACCURACY

**STANDARD**  
SINCE 1872  
**HORSE NAIL CORP.**  
NEW BRIGHTON, PA.

# PRECISION INTERNAL FORMING



with a  
**MAXWELL**  
**RECESS-O-MATIC**

Fast set-up . . . repetitive accuracy . . . maximum capacity and throw . . . these features make the RECESS-O-MATIC tool superior for precision internal forming operations. Designed especially for use on multiple-spindle automatics, this tool can be attached quickly without need for special cams.

The RECESS-O-MATIC is available in three sizes having maximum capacities of 2, 3 and 4 inches. Recessing stroke ranges from 1/4 to 1/2-inch.

Write for catalog.  
(Model DB)



**THE MAXWELL  
COMPANY**

380 Broadway • Bedford, Ohio

# CLIPPER

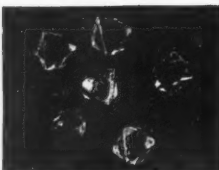
## PRECISION DIAMOND TOOLS

Industrial Diamonds  
Thread Grinders  
Turning Tools  
Engraving Tools  
Dressing Tools  
Diamond Powder



J & L  
Thread  
Grinder  
Dressing Tool

Every CLIPPER tool is guaranteed. Send blueprints. Let us quote on your requirements.



Quick Delivery on Diamond Wheels  
Representatives in Principal Cities

CLIPPER DIAMOND TOOL CO., INC.

21-C W. 46 ST. N.Y. 19



# Tomco



HAND WHEELS  
HAND KNOBS  
MACHINE HANDLES  
HANDLES  
BALL HANDLES  
SPECIALTIES

Write for literature

**Tomco**  
PRODUCTS CO.

1423 DOUGLAS AVE.  
RACINE • WISCONSIN

Blank or Machined - from stock

**Practical Design Guide.** By Richard Rinehuls, P. O. Box 549, Binghamton, N. Y. 100 pages. 200 illustrations. Price, \$2.00.

Consisting of practical ideas for industrial applications, this source book is designed to serve as a stimulus for ideas, as well as a guide and reference, for developing machines, tools, and manufacturing methods. The field of pneumatics is fully covered, and a thorough discussion dealing with the purpose and construction of valves and cylinders, practical circuits in application, and steps in application is included. A well-prepared chapter provides detailed information on electrical controls, including common circuits, automatic gaging, drives, motors, starters, and solenoids.

Information concerning Geneva movements and practical applications, automatic feeds, springs, and cam design, including the selection of motions, errors common to cam design, and developing and designing cams, is also contained in the book.



## Why THOR STAMPS Last Longer



... because they're made of a special, correctly-heated alloy steel. Central striking point assures uniform marking. Thumb side marking assures easy use.

You get more mark per dollar with THOR STAMPS. Write for catalog and prices.

**The Pittsburgh Stamp Co., Inc.**  
812 CANAL ST. • PITTSBURGH, PA.

## PRECISION MEASURING

**SCHERR**  
MICROMETERS



Drop-forged steel frame easy to read. "No Glare" graduations. Guaranteed accuracy and unsurpassed workmanship.

For greater savings in dollars and better satisfaction, use "Scherr Tools".

Complete stock. All sizes — MM. or Inch.

**MAUSER**  
VERNIER CALIPER



For inside - outside and depth measurements in 1/1000, 1/128, 1/10mm and 1/20mm.

If not available from your dealer, order direct.

WRITE FOR ILLUSTRATED CATALOG

**GEORGE SCHERR CO., Inc.**  
COMPLETE LINE OF PRECISION INSTRUMENTS  
198-A Lafayette St., New York 12, N. Y.

## for greater RIGIDITY more ACCURATE cuts



## use CRITERION

**CRITERION**  
machine  
WORKS

### BORING HEADS

A full line of adjustable boring heads and bars now available. Heads 1½" to 7" dia. Carbide or high speed bars ¾" to 1¼" dia. Lead screws ground AFTER HARDENING. Ample bearing surface, heat treated parts, interchangeable shanks. Criterion tools are the criterion. Write for free catalog and costs.

9312 SANTA MONICA BLVD. • BEVERLY HILLS, CALIF.

## new shop equipment

### **Production Heat-Treating Unit Features Automatic Sealed Atmosphere and Temperature Control**

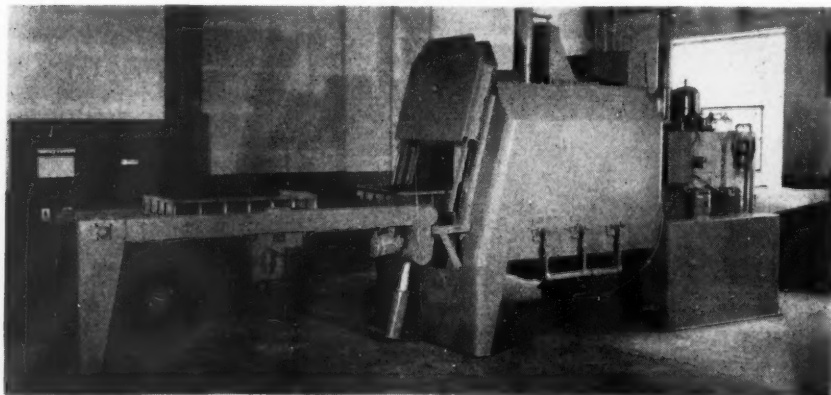
A medium size heat-treating unit of 500 lb. per hour capacity for bright heat treating, carburizing, carbonitriding, martempering, and annealing operations has been announced by Ipsen Industries, Inc., 721 S. Main St., Rockford, Ill. Identified as the Model T-500, the unit is available for either electric or gas-fired operation and features automatic sealed atmosphere and temperature control and automatic transfer of work from heat through the quenching or cooling cycle. A semi-automatic loader with loading space for two work trays is provided as

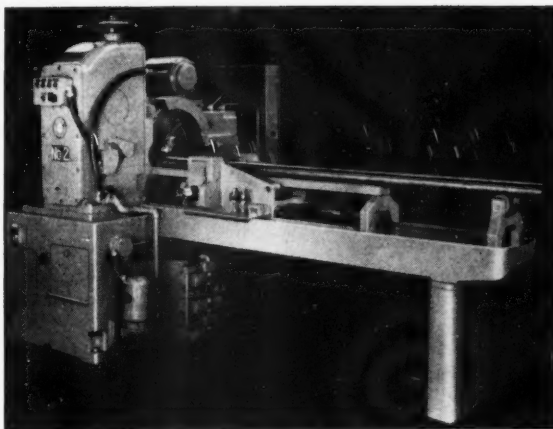
standard equipment of the unit.

The unit is designed with the quench tank direct-connected to the heating chamber, separated by an automatic air-draulic-operated intermediate door. Power-driven endless chains recessed in the hearth and equipped with protruding lugs transfer the work from the heating chamber onto an elevator rack over the quench tank. When idle, the section of chain equipped with lugs remains out of the heat zone below the hearth. As the transfer cycle is initiated, the cold chain and lugs move into position in contact with the work trays. Since the hot chain moves freely beyond the driving sprockets before load is applied, any excessive stretch or distortion is said to be eliminated.

The Model T-500 has a maximum operating temperature of 1,750 deg. F. and

Ipsen Model T-500 Production Heat-Treating Unit





**Motch & Merryweather No. 2  
Circular Sawing Machine  
with Special Gripper Type  
Bar Feeder**

measures 5 feet 11 inches wide x 12 feet long without loaders and 26 feet 8 inches long with loaders. The hearth is 30 inches wide x 48 inches deep x 20 inches high.

### **Special Feeder Automatically Feeds Stock for Shell Forgings**

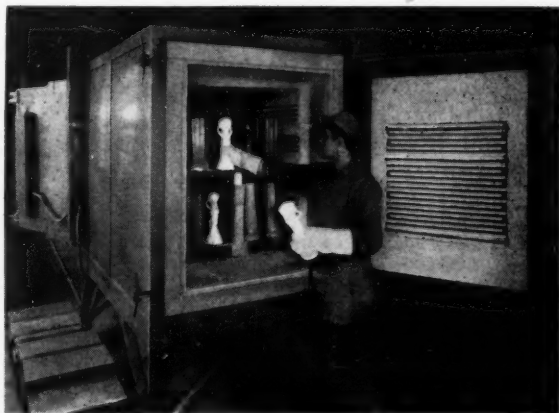
The Motch & Merryweather Machinery Co., 715 Penton Bldg., Cleveland 13, Ohio, has announced that its standard No. 2 circular sawing machine can now be equipped with a special feeder which is designed particularly to automatically feed bar stock for steel forgings. The feeder consists of two heavy duty, hardened, serrated grippers mounted on a slide. The bar stock is positioned on the supporting V-channel under the hydraulically actuated vertical vise for the initial cropping, squaring cut. Thereafter, the feed is automatic. The grippers clamp the stock, and the entire slide, operating between positive stops, moves the stock forward the required length. As soon as the stock is clamped in the vise, the grippers release, the slide moves to the

rear stop, and the grippers reclamp. Slide movement and clamping are effected by hydraulic cylinders. Wear parts are hardened and ground, with automatic lubrication provided for sliding surfaces. The gripper type bar feeder has a capacity for stock from 1 to 6½ inches in diameter and a feed length of ¼ to 36 inches.

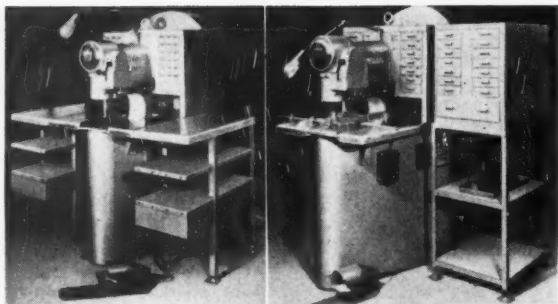
### **Furnace Is Built for 2,200-Deg. F. Operation**

Built for 2,200-deg. F. operation, the Huppert High Temperature Furnace illustrated herewith, product of K. H. Huppert Co., 6841 Cottage Grove Ave., Chicago 36, Ill., has non-flaking non-oxidizing high temperature alloy elements and high temperature insulating refractories backed up by high temperature insulation.

The furnace, which can be used for firing ceramics or other high temperature operations, is made in various sizes from 8 inches wide x 12 inches high x 10 inches deep to 30 inches wide x 36 inches high x 72 inches deep.



**Huppert High Temperature  
Furnace**



(Left) Combination work tables and tool racks—one on each side of Wales Sheet Metal Fabricator. (Right) Auxiliary cabinet and tool rack with Wales Sheet Metal Fabricator.

### Combination Work Tables and Tool Racks and Auxiliary Cabinet and Tool Rack for Wales Sheet Metal Fabricator

Announcement of a pair of combination work tables and tool racks and auxiliary cabinet and tool rack as optional equipment with the Wales Sheet Metal Fabricator has been made by Wales-Strippit Corp., 398 Payne Ave., North Tonawanda, N. Y. The combination work tables and tool racks are placed on each side of the Wales Fabricator and are the same height as the bed table. The table-rack combination, adjustable front-to-back, is equipped with adjustable feet for leveling and provides additional work and storage area for more efficient operation. The auxiliary cabinet and tool rack provides additional drawers to hold punch assemblies and dies, as well as two shelves for the purpose of storing other tooling for the Wales Fabricator.

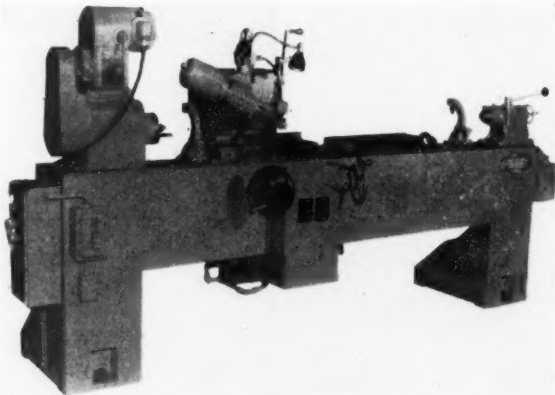
held firmly in a rigid position with no chance for misalignment, and (2) minimum floor space is required for the machine.

With the broach held stationary, the adjustments for sharpening same are made with the grinding wheel spindle, which is mounted on a traversing carriage and equipment with micrometer adjustment. The spindle is driven by means of a 3,600 r.p.m. motor which has provisions for adaptation to operation at speeds up to 15,000 revolutions per minute.

For quick conversion to flat or surface broach sharpening, a Sundstrand Magnetic Viking Chuck with power unit and demagnetizer is available as optional equipment for the machine. To sharpen a surface type broach, the chuck is simply placed on the machine bed and the broach positioned for grinding, with the final adjustments being made with the micrometer controls of the grinding wheel spindle.

### Machine Sharpens Round and Flat Type Broaches

A universal type broach sharpening machine which is designed to sharpen both round and flat type broaches has been developed by American Boarch & Machine Co., Ann Arbor, Mich. The machine has a sta-



American Universal Type Broach Sharpening Machine

**3 times the  
productive capacity  
for the same tool  
investment**



**Write for  
CATALOG**

**SHELDON**  
CHICAGO U. S. A.

Old timers still tend to gauge a machine tool's productive capacity by its size and mass, and its accuracy by its cost. These old "rules" do not apply today, in the face of advanced machine tool engineering and modern machine tool building methods. For example, a modern TS56B Sheldon Precision Lathe, weighing around 1000 lbs., will handle the great bulk of production lathe work, and it has "Zero Precision" Timken Taper Roller Bearings — more accurate spindle bearings than found in 90% of the lathes of all sizes.

By scientific distribution of metal (rather than sheer mass) these new machine tools have rigidity and stamina not always obtained in more cumbersome machine tools. Lighter, handier and easier to run, they can be safely operated by the less experienced—by whatever operators available.

Produced in numbers, in a specially built and tooled plant, Sheldon Precision Machine Tools are low in price. Today for the cost of a single older type tool you can have 2, 3 or even 4 SHELDON units . . . can put 2, 3 or 4 operators to work . . . can double or triple your productive capacity for the same machine tool investment. *Let us show you how.*

**SHELDON MACHINE CO., INC.**

**4250 N. Knox Ave., Chicago 41, Ill.**

## Utilities Rack Designed for Handling Parts in Production or Assembly

A utilities rack designed for handling parts or small items in the course of production or assembly is now being manufactured by Palmer-Shile Co., 16022 Fullerton Ave., Detroit 27, Mich. Of all-steel welded construction, the rack includes four casters, two of which are of the swivel type and two of the rigid type. The rack measures 24 inches wide x 50 inches high x 48 inches long overall and has a 12-inch clearance between shelves. It



Palmer-Shile Utilities Rack

weighs approximately 220 lb. The rack can also be supplied in special designs to meet any production requirement.

## READING BENCH KEYSEATER

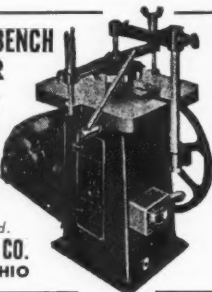
Portable—move directly to job; a time saver for both small and large shops.

3 3/4" stroke; adaptable for other work.

Low first cost — prompt delivery.

Good dealers wanted.

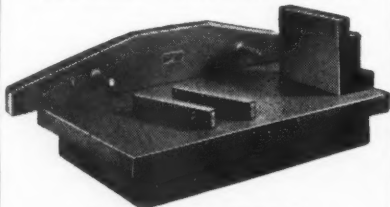
**READING MACHINE CO.**  
CINCINNATI 37, OHIO



## A COMPLETE LINE OF BASIC PRECISION INSPECTION EQUIPMENT

### RAHN BLACK GRANITE

SURFACE PLATES—ANGLE PLATES  
PARALLELS—STRAIGHT EDGES



Accuracy to .00005"

*Warp-free, Rust-free, Bump-free,  
Extra Hard, Super Smooth!*

**FREE TRIAL — WRITE TODAY!**

**RAHN GRANITE SURFACE PLATE CO.**

636 N. WESTERN

DAYTON 7, OHIO

## Magnetic Chuck Is Specially Designed for Smaller Machine Tools

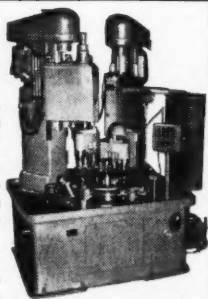
Magna-Lock, Inc., Dept 260, Big Rapids, Mich., has announced a small electromagnetic chuck specially designed for smaller machine tools and for bench work. The chuck, which is available in three sizes of 5 x 10, 6 x 12, and 6 x 18 inches, is said to facilitate the holding of workpieces for hand sawing, scraping, layout, filing, welding, drilling, grinding, and similar operations.

Precision built, the chuck is of all-steel

## KAUFMAN TAPPING MACHINES

Every machine precision-built to meet the requirements of individual production jobs. Designed with fully automatic cycle, single or multiple spindle heads and other most advanced features.

Write for information  
**KAUFMAN MFG. CO.**  
Manitowac, Wisconsin



## NEW PROCUNIER TAPPERS

Work **FASTER**

Last **LONGER**

...and save Taps too!

Procunier Tapping Equipment is the answer to today's pressing need for tapping equipment that will meet current high-speed production demands and at the same time reduce maintenance and operating costs.

Developed by practical craftsmen—who have concentrated exclusively on developing, improving and perfecting tappers for more than 30 years—Procunier tappers offer the rare combination of high speed, dependable accuracy, lasting endurance and economy of operation. Special exclusive construction features enable them to cut threads faster, for longer periods—with fewer spoiled pieces, fewer rejects. Here's why:

1. *Tap breakage is practically eliminated* due to the high sensitivity of the new Procunier cork-faced friction clutch which automatically regulates driving pressure. Thus, even "green" operators can quickly detect dull or loaded taps by the "feel" or pressure on the clutch.
2. *Strain and wear are minimized* and torsion eliminated thru special gear reversing mechanism which distributes pull thru three intermediate gears.
3. *Chuck spindle is supported at both ends* assuring true operation—avoiding tap wobble.
4. *Aluminum housings assure greater strength and rigidity* with minimum weight—a vital factor for high speed tapping.
5. **PLUS** many other exclusive features.

**WRITE TODAY** for more complete details and specifications on the complete line of Procunier Tapping Heads and see why Procunier offers the "finest in tapping equipment."

**PROCUNIER SAFETY CHUCK CO.**  
12 S. Clinton St., Chicago 6, Ill., Dept. 9

Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

Name .....  
Address .....  
City..... Zone..... State.....



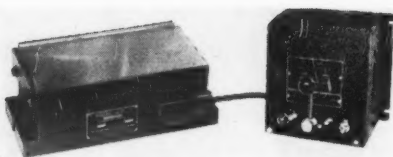
### with the NEW "TRU-GRIP" Tap Holder

The exclusive Procunier "Tru-Grip" tap holder is lighter, smaller in diameter. It affords easier tapping close to walls or shoulders, eliminates "chewed" tap shanks. Holds tap true.

# Procunier

SAFETY CHUCK CO.

12 SO. CLINTON ST. CHICAGO 6, ILL.



Magna-Lock Magnetic Chuck with rectifier

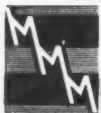
construction and is designed to operate on alternating current. According to the manufacturer, the chuck is moistureproof and shockproof and has an unusually

large magnetic area, thus permitting pieces to be firmly held to the extreme edges of the chuck. A complete line of standard accessories is available for use with the chuck.

### Improved Die Cushion Provides Maximum Strength with Minimum Weight

An improved universal die cushion announced by Dayton Rogers Mfg. Co., Minneapolis 7, Minn., is claimed to provide greater strength, with every size designed to keep weight at a minimum while reinforcing all critical stressed sections. A fully hardened and

Ask for this set of four Motch & Merryweather folders. Altogether, they give a pretty complete picture of cut-off blades made for fast, usable production — M & M's well known segmental type, solid blades and slitting and slotting blades. Better still, get the folders from your local Motch & Merryweather dealer.

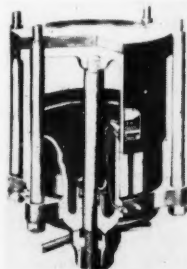


**THE MOTCH & MERRYWEATHER MACHINERY CO.**

PENTON BUILDING

CLEVELAND 13, OHIO

COMMAND OUR UNPARALLELED EXPERIENCE IN CIRCULAR SAWING . . .



Dayton Rogers Improved Universal Die Cushion

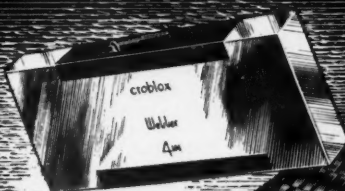
ground pin pressure pad, made to fit the press bed opening, is claimed to assure accurate pad alignment at all times. The pad is maintained in parallel alignment during the work cycle by the over-size hardened and ground, hard chrome plated, fully guided, reciprocating cylinder section of the die cushion.

Said to have uniform grain structure and high tensile strength, the semi-steel

Announcing

# croblox

**Now! A CARBIDE GAGE BLOCK  
WITH THE SAME EXPANSION AS STEEL**



A new metallurgical triumph has come out of the laboratory and is added to a growing list of improvements in the science of precision measurement made possible by Webber enterprise.

The new material is a carbide of chromium and is identified to the trade as CROBLOX.

In addition to its long wearing qualities commonly associated with carbide, CROBLOX has the same coefficient of expansion as steel, a factor that makes it easy to use in measurement of split-tenths.

CROBLOX not only avoids the thermal expansion factor of ordinary carbide, it also has greater resistance to corrosion making it possible to use them under all types of atmospheric conditions. CROBLOX is built to give a lifetime of service under average conditions. Write for folder.

**A NEW MILESTONE IN  
PRECISION MEASUREMENT**

Write for  
New Complete  
Catalog!

## Webber

**GAGE BLOCKS**

The Webber Gage Company  
12899 Triskett Rd., Cleveland 11, Ohio



CROBLOX  
CARBIDE



STANDARD  
STEEL



ANGLE  
BLOCKS



HEAVY-DUTY  
BLOCKS



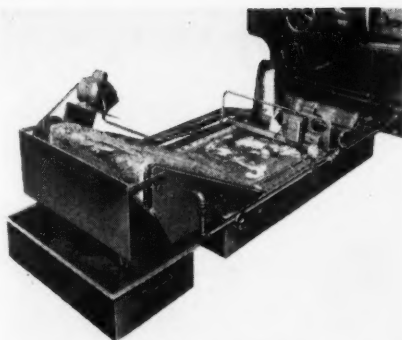
**LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS**

die cushion is designed so that it can be fastened directly to the bolster plate or provided with a mounting plate whereby it can be installed on the press bed. The cushion is furnished complete ready to install with a combination reducing regulating valve and pressure gage, and can be operated on standard air pressure supplied by the average shop air line.

### Industrial Endless Belt Filter Permits Repeated Use of Same Filtering Media

Through the use of an endless belt, the Delpark Industrial Endless Belt Filter now being distributed by Industrial Filtration Co., Lebanon, Ind., permits the utilization of the same filtering media over and over. The filter, designed to serve individual machine tools or larger central coolant systems, can also be applied to numerous other industrial applications.

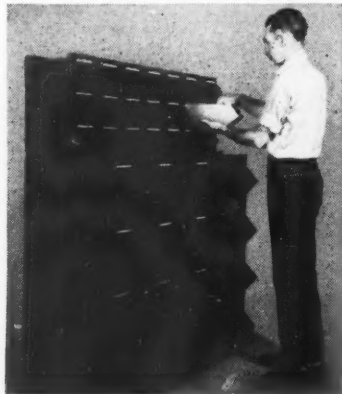
The Delpark Filter is a continuous, self-cleaning gravity filter which filters solids from liquids that will flow by gravity through filter material and discharges the solids in a relatively dry state into an outside container. The filter material, in the form of endless belting, rests on and



Delpark Industrial Endless Belt Filter

conforms to a flat endless conveyor of open construction. Sloping sides form a shallow pool of the conveyor, and an inclined discharge ramp provides for the removal of filtered solids. The filtered solids are discharged from the endless belt at the end of the ramp into a disposal container.

The Delpark Filter is available in sizes capable of filtering from 2 gallons to 1,000 gallons per minute.



Manufactured and sold in Canada exclusively  
by Wickware-Stackbin, Ltd., Ottawa  
Write Stackbin Corp., 1083 Main St., Pawtucket, R. I.

## REDUCE HANDLING of Tools, Parts and Materials

Because Stackbins are portable containers — not fixtures — tools, parts and materials can be carried to departments, from machine to machine, or held in stockrooms without being transferred from one container to another. Stored in Stackracks, any Stackbin is instantly accessible when its contents are needed — without disturbing any other bin. *Stackbins* — individual hopper-fronted stacking bins, slide like drawers in *Stackracks* — individual units which lock together to form racks of any size, shape or capacity.

**STACKBINS  
IN  
STACKRACKS**

**STACKBIN**

"Stacked and



Still Accessible"

**SYSTEM**

**AUTOM**



## CONTINUOUS HINGES

*Manufactured by*

**AUTO MOULDING  
& MFG. CO.**

**WRITE FOR STOCK LIST**

**1114 E. 87TH ST.**

**CHICAGO 19**

## USE ECONOMY

**Headless  
Set  
Screws**

**Socket  
Set Screws**



**Try Them On Your Next Job!**

**ECONOMY  
MACHINE PRODUCTS  
COMPANY**

**5212 Lawrence Ave., Chicago 30, Ill.**

*engineers:*

*Southern  
California*

*is calling*

**A better job, a better life, a better future** can be yours in California—at Lockheed Aircraft Corporation.

On the job, you enjoy increased pay; fine, modern working conditions; association with top men in your profession—men who have helped build Lockheed's reputation for leadership.

Off the job, you live in a climate beyond compare—where outdoor living can be enjoyed the year around.

In addition, Lockheed's production rate and backlog of orders—for commercial as well as military aircraft—insures your future.

**To engineers in non-aeronautical fields.** The step up to Aircraft Engineering isn't as steep as you might expect. Aircraft experience isn't necessary. Lockheed takes your experience, your knowledge of engineering principles, your aptitude and adapts them to aircraft work in its Engineer Training Center.

You learn to work with closer tolerances. You become more weight-conscious. You may attend classes in the Training Center for three days—or six weeks. It depends on your background. But, always, you learn at full pay.

Mr. M. V. Mattson, Dept. MMS-9

# LOCKHEED

**AIRCRAFT CORPORATION, Burbank, Calif.**

Dear Sir: Please send me your brochure describing life and work at Lockheed.

My name \_\_\_\_\_

My address \_\_\_\_\_

My city and state \_\_\_\_\_

My occupation (type of engineer) \_\_\_\_\_

## Roller Saves Time and Offers Bending Versatility

A hand-operated slip roll which is designed to form complete circles in 16 gauge steel in a minimum of time and also form bends at any point in a sheet of material has been announced by O'Neal-Irwin Mfg. Co., 576 8th Ave., Lake City, Minn. Designated as the Di-Acro Roller, the unit features a cam actuated idler roll which permits complete circles of 1-inch diameter or larger to be formed in two passes through the rolls. Circles of 1-inch diameter only can be formed in just one pass through the roller by making slightly



Di-Acro Roller being used to form bends in a sheet of material

## A Real Spring Winder!



Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

No. 1 Capacity 0 thru 3/32" wire \$1.50

No. 2 Capacity 0 thru 3/16" wire \$3.00

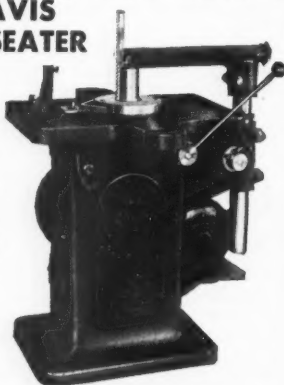
No. 3 Capacity 0 thru 5/16" wire \$5.00

**HJORTH LATHE & TOOL CO.**  
10 BEACON STREET WOBURN, MASS.

## Why Use A Shaper to cut Keyways when a DAVIS KEYSEATER

will do the job so much quicker and better?

Circular Send for



**DAVIS KEYSEATER CO.**  
Exchange and Glasgow Sts.  
ROCHESTER, N. Y.

different adjustments. Bends can also be located in any position along a sheet of material being formed in the roller since the material can be fed through the roller without bending until the cam lever is engaged. As a result, a wide variety of shapes—with straight sections on both sides of the bend—can be produced.

Round, flat, and square stock, as well as many other ductile materials, can be formed with the Di-Acro Roller, which has a maximum forming capacity of 1/4-inch round steel bar and 1/4-inch tubing, or their equivalents. Special rolls for special bending jobs can be supplied. The roller is available in two sizes, the No. 1 size forming material up to 6 inches in width and the No. 2 size material up to 12 inches in width. Both sizes are designed to form material to a 1-inch or larger diameter.

## HIGH SPEED DRILLS FLAT TWISTED AND ROLLED SECTION



Special Lengths and Types  
**PROMPT DELIVERY**  
Manufacturers Since 1903

**HI-DUTY DRILL WORKS**  
FLEETWOOD, PA.

## T. H. LEWTHWAITE MACHINE CO.

### METAL LATHERS' BENDER



This machine will bend up to  $\frac{1}{2}$ " square or round iron,  $2" \times \frac{1}{2}"$  channel iron,  $2\frac{1}{4}" \times 5/16"$  flat iron cold. Weight 40 lbs.

Circular on Request

317 EAST 47TH ST. NEW YORK CITY  
PLaza 8-0380

*Whiton*

### UNIVERSAL LATHE CHUCKS

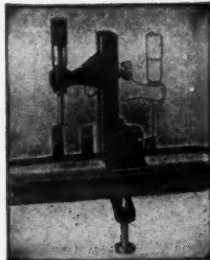
Send For Catalog G-WU-50

THE WHITON MACHINE CO.

New London Conn.

## SAVE TIME

With  
Bartelt  
Gages



• Use a Bartelt Pedestal Micrometer for setting boring tools and for many other shop operations requiring accurate positioning relative to a fixed base. Make settings in one step — eliminate cut-and-try methods. Model B, with reversible slide, shown. Write for literature describing all models.

**BARTELT ENGINEERING CO.**

1216 PARTRIDGE AVE.

BELOIT

WISCONSIN

Handy NEW 6 in 1 Wrench for Socket Screws

## HEX-UNI-KEY

LIST  
PRICE  
**\$1**



(Actual Size)

No worry about losing socket screw wrenches with Hex-Uni-Key. Now wrenches for the six most popular sizes are always ready for instant use — in one unit. Wrenches hardened, tempered and tested for long life. Special deformed end to prevent loosening in holder.

### FITS SET SCREWS

From No. 8 to  $7/16"$

### CAP SCREWS

From No. 4 to  $5/16"$

### A UNIVERSAL SOCKET SCREW WRENCH FOR:

- Mechanics
- Tool Makers
- Refrigeration Repairs
- Electricians
- Radio Repair
- Home Workshops

**EKLIND TOOL & MFG. CO.**

2627 N. Western Ave., Chicago 47, Ill.

## Stick-Type Lubricant Extends Tool Life and Facilitates Cutting Performance

A stick-type wax lubricant is now being marketed by The DoAll Co., 254 N. Laurel



Illustration showing DoAll "Tool-Saver" being applied to a twist drill

Ave., Des Plaines, Ill., for the lubrication of cutting tools, threaded metal fastenings, and other metallic forming

tools used in production manufacturing, toolrooms, and workshops. The product which is known as "Tool-Saver," is a special formula of fine wax ingredients designed to considerably reduce the friction and accompanying heat occurring in machining operations, thus facilitating cutting performance while prolonging tool life and preserving tool temper. According to the manufacturer, the lubricant helps prevent detrimental abrading, scoring, or burning of a tool or the work and noticeably improves surface finish on the machined material. In many cases, burrs resulting from machining are said to be eliminated through the use of the lubricant.

A pound of DoAll Tool-Saver is supplied in a handy "push-out" cardboard dispenser tube measuring 11 inches long x 2 inches in diameter. To use, the wax "cylinder" in the tube is simply pushed from one end of the tube until a portion of the cylinder is exposed. The exposed portion is then rubbed against the surface or edge to be lubricated. DoAll Tool-Saver is recommended for use on such tools as saw bands, knife bands, circular saws, hack saws, twist drills, taps, reamers, countersinks, spinning tools, grinding wheels, sanding belts or wheels, routing tools, and other products.

## SET OF 14 Nicholson Mandrels

Takes Every Size Bore  $\frac{1}{2}$ " to 7"



Actually 209 solid arbors would be required to fit all bores between  $\frac{1}{2}$ " and 7", advancing by  $\frac{1}{32}$ ". But 14 Nicholson Expanding Mandrels will accommodate this entire range, and all in-between sizes as well. Hard-

ened tool steel. Sold singly or in sets. The standard in shops the nation over. **BULLETIN 750** shows how to save time, promote precision with these widely used tools.

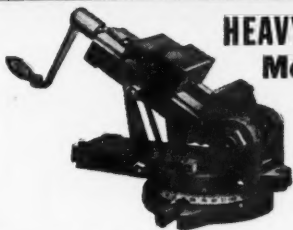
136 Oregon St., Wilkes-Barre, Pa.

# W. H. NICHOLSON & CO.

## TRAPS · VALVES · FLOATS

# PALMGREN

## ANGLE VISES



### HEAVY-DUTY Model

**For Quick - Accurate Set-ups**  
PALMGREN Heavy Duty Angle Vises are built sturdy and rugged for tough, heavy jobs. They are accurately graduated in degrees, can be quickly adjusted to any angle, stay locked under severe service and save valuable hours otherwise wasted in tedious make-ready, wedging or making temporary jigs and fixtures.

Jaws are hardened and ground. Special outstanding features are the size and opening of jaws—4" jaws open full 4"; the 6" jaws open full 6", etc., with corresponding depth of jaws. Vise can be used as ordinary vise when lowered to horizontal position. Swivel base furnished if desired. Bases 4", 6" and 8" jaws and openings. Prompt deliveries. Write for bulletin on PALMGREN Vises.

**CHICAGO TOOL & ENGINEERING CO.**  
Div. of PALMGREN PRODUCTS for over 25 years  
3399 SOUTH CHICAGO AVENUE • • • CHICAGO

**PRECISION WORK AT ANY ANGLE**

**ORDER TODAY**  
Be Sure of Immediate Deliveries

## General FLEXIBLE POWER PRESSES



For Foolproof Production

- Straightening
- Cold Riveting
- Assembling

New versatile long stroke standard models cost less. Anyone can operate flexible presses productively in a few hours. You can actually feel the pressure and know instantly how much to apply. **TRY ONE BEFORE YOU BUY.**  
Write for Bulletin 392.

**General MANUFACTURING CO.**

6433 FARNSWORTH

DETROIT 11, MICHIGAN

## NEW "MITI-MITE" NO. 250

**DUPLEX MAGNETIC BASE LIGHTING UNIT THAT MOUNTS TO CURVED OR FLAT SURFACES INSTANTLY**



Holds up to 100 watt standard bulb.

6 Ft. 18-2 oil resistant cord comes with each set.

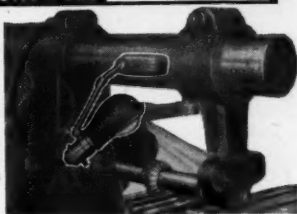
Fingertip lever releases magnet for removal or repositioning. Magnetic pull — 100 lbs. Base size 1 1/4" x 4"

Ball and socket bracket assembly permits precision adjustment.

eliminates haphazard clamping. Provides perfect illumination for practically all machines and operations.

**PRICE \$18.50 Complete**

Solves lighting problems heretofore regarded as impossible. Eliminates cumbersome, haphazard clamping. Provides perfect illumination for practically all machines and operations.



Other "MITI-MITE" ITEMS Also Mfgs. of Enco Lathe Turrets

No. 100	Magnetic Base Holder for smaller test indicators.	\$ 7.50
No. 120	Combination Test Indicator magnetic base holder and double lens 4X Magnifier.	\$12.00
No. 130	Duplex Magnetic Base Holder for all dial indicators up to 3" dia.	\$15.50
No. 200	Magnetic Base Handi-Like complete with 25 and 40 watt bulbs.	\$ 8.50
No. 250	Duplex Magnetic Base Lighting Unit. Holds up to 100 Watt Standard Bulb.	\$18.50
No. 300	Portable De-Magnetizer.	\$10.50

**ENCO MANUFACTURING COMPANY, Dept. 192**

4524 W. Fullerton Ave.,

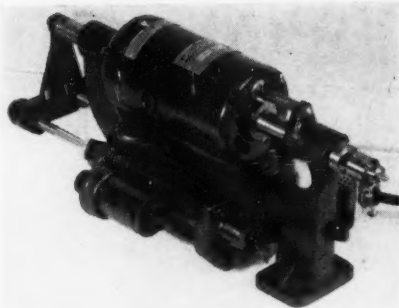
CHICAGO 39, ILL.

Order from your mill supply dealer or send order with name of your mill supply dealer

**SEND FOR BULLETIN 604**

### Automatic Drilling Unit

An automatic drilling unit which is claimed to provide for unusually fast small-hole drilling is now being marketed by The Electro-Mechano Co., 265 E. Erie St., Milwaukee, Wis. The proper drill speed can be instantly set on the unit by positioning the speed control lever at the desired r.p.m. indicated on the spindle speed index. An air feed unit provides for easily adjusted, rapid approach of the



Electro-Mechano Model 109 Automatic Drilling Unit

## STAMPINGS

**PILOT RUN  
AND  
PRODUCTION RUN**



**from the same  
approved source.**

Send for literature

**STAMPINGS  
DIVISION**



3309 UNION STREET, GLENBROOK, CONN.

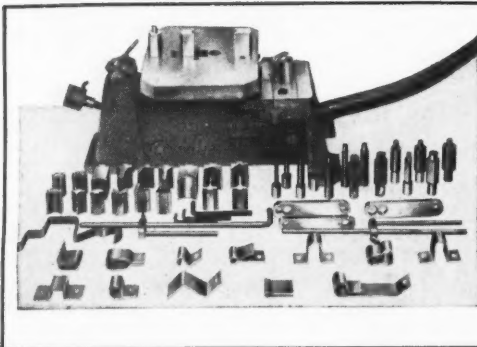
drill to the work. The proper rate of feed is obtained by the use of a hydro-check which is basically a hydraulic resistance unit with a metering valve to control the rate of oil flow from one side of its piston to the other.

Where close depth tolerances must be maintained, a positive mechanical depth stop is provided, which can be readily adjusted. Rapid withdrawal of the drill after the drilling operation is completed is afforded by the double-action which drives the drill back out of the work.

The Electro-Mechano Automatic Drilling Unit has a drilling capacity of 0.004 to  $\frac{1}{8}$  inch in steel and is available in two models; namely, Model 108 with column mount and Model 109 with pad mount.

### Circular Saw Sharpener

Known as the "Easy Cut," a cam-actuated circular saw sharpener for wide tooth spaced saws has been introduced by Han-



## Multiform

### BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds Into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

**AIR OR HAND MODELS FOR UP TO  
 $\frac{1}{4}$ " to 4" MATERIAL**

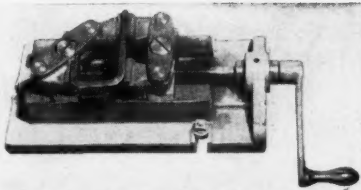
Write for brochure which illustrates and describes the four bender models.

**J. A. RICHARDS CO.**

Dept. 6 M

Kalamazoo, Mich.

## CLAMPMASTER



### THE VISE THAT HOLDS EVERYTHING

Eliminates fixtures for the holding of odd-shaped work pieces. Quick adjustment for positive holding of round, elliptical, tapered, triangular, or irregular shapes. Two moving jaws for quick centering of work. Available in four sizes for bench or machine work of all types.

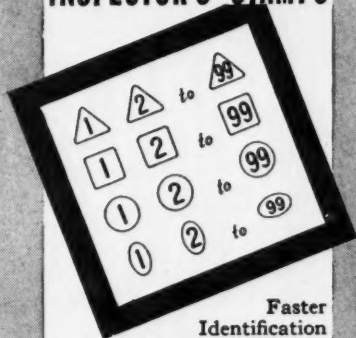
#### THE VISE OF A THOUSAND USES

For full information write

**KARL A. NEISE**

381 - 4th Ave., Dept. MMS, N. Y. 16, N. Y.

## INSPECTOR'S STAMPS

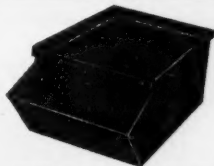


**Faster Identification**  
of Inspectors or Operators.  
Different borders may be used for different shifts. Available in 4 sizes. Write for prices today.

**NEW METHOD STEEL STAMPS, Inc.**  
145 JOS. CAMPAU DETROIT, U. S. A.



# Stack Up



Sterling Bin Front "Top Rim"  
Steel Stacking Box.  
Size: 18" x 12" x 6".

### THESE BOXES AGAINST ANY!

Once you use and compare Sterling stacking boxes, you'll know why we invite comparison in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box . . . no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

Write for literature and prices.

Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.

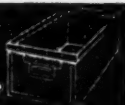


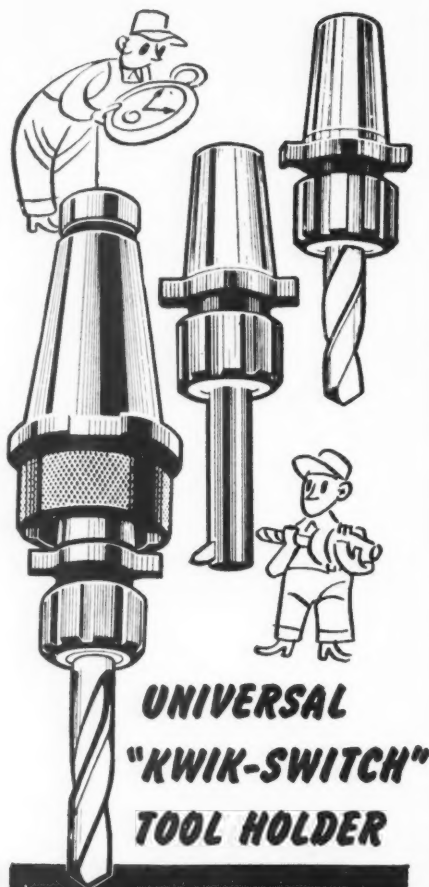
Sterling "Top Rim" Steel Stacking Box with drop handles.  
Size: 18" x 12" x 6".



# Sterling

Quality Handling & Storage Equipment

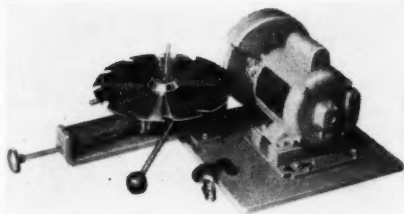




**permits 10 second  
tool changes  
without  
accuracy losses**

**UNIVERSAL  
ENGINEERING CO.**

**FRANKENMUTH 9, MICH.**



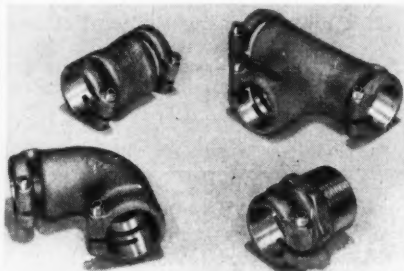
Hanchett "Easy Cut" Circular Saw Sharpener

chett Mfg. Co., Big Rapids, Mich. Said to accurately generate the correct tooth shape with uniform, sharp clean saw teeth, the unit has a capacity for saws from 6 to 24 inches in diameter and is equipped with a special  $\frac{1}{2}$  h.p. capacitor motor. A spring-actuated feed finger and saw hook adjustment from 0 to 30 degrees are additional features of the sharpener, which is furnished complete with saw bushings in sizes from  $\frac{1}{4}$  to 2 inches in diameter, as well as with a Hanchett Red Anchor grinding wheel and wheel guard. The unit is also said to perform efficiently as a hand gummer.

### Fitting Joins Pipe or Tube without Threading or Welding

Known as the "Quikupl," a stainless steel fitting which can be joined to tube or pipe without threading, flaring, sweat-soldering, brazing, or welding is now being distributed by Peter A. Frasse & Co., Inc., 17 Grand St., New York, N. Y. With the fitting, pipe or tube is simply cut to length, deburred, and inserted in the fitting. The coupling is completed merely by tightening a small screw. Inside the fitting is a synthetic sealing ring which

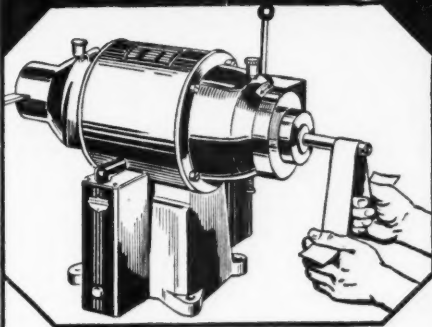
"Quikupl" Stainless Steel Fittings



# Cut Polishing Time up to 80%

*with*

## SCHAUER SPEED LATHES



Write for BULLETIN 500 showing types  
for all secondary finishing operations.

**SCHAUER MANUFACTURING CORP.**

4501 ALPINE AVE.

Users report production increases of 50% to 100% over former methods when Schauer Speed Lathes are used to polish, lap, de-burr or finish metal or plastic parts. These high-production machines do the job speedier, better, and at lower cost.

- Originators of Today's Speed Lathes

CINCINNATI 36, OHIO

## RIMAT DIAL BORE GAGES

**FOR PRECISION  
MEASUREMENT OF:**

"O" Ring Grooves  
Snap Ring Grooves  
Thread Reliefs, Etc.



**SIZES  
.300" to 6.000"**

The original indicator gage designed for  
measurement of internal groove diameters

For Information Write To

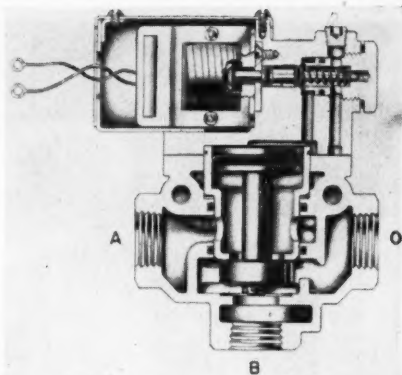
**RIMAT TOOL CO.** • 23 West Dayton Street, Pasadena 2, Calif.

is so constructed that it is said to provide and maintain a squeeze fit regardless of commercial tube and pipe tolerances.

The Quikupl Fitting is manufactured in tees, couplings, ells, (45 and 90 degrees), and adapters in Types 304 and 316 stainless steels.

### Air Control Valve Provides Maximum Safety

Identified as the Series B-3 "Pilot-Master," a three-way solenoid valve designed




Cross-sectional view of Hannifin Series B-3 "Pilot-Master" Valve

**New Nesting Type  
TOTE PANS**

20" Long x 12"  
Wide x 6 1/4" Deep  
16 Ga., drag holes,  
handles both ends.



**J. L. LUCAS & SON, INC.**  
BRIDGEPORT 5, CONN.



**GRAY TURRET HEAD METAL  
CUTTER OR NIBBLER**

**N.A.M.** Pioneer Award  
Given to Gray

Most modern Nibbler for  
Template Cutting, Tool  
Rooms, Shipbuilding, Air-  
craft Parts, Aircraft Tub-  
ing, Sheet & Plate Shops.

**GRAY MACHINE CO.**  
Box 596, Philadelphia, Pa.

especially for hazardous applications has been announced by Hannifin Corp., 1136 S. Kilbourn Ave., Chicago 24, Ill. The principal use of this valve is expected to be for the control of clutch and brake cylinders on mechanical presses where the failure of a valve to reverse when the solenoid is de-energized might result in serious injury to the press operator.

The main or "master" valve portion can be operated either two-way or three-way, normally closed to pressure or normally opened. The recommended pressure range is from 40 to 125 p.s.i. in order to keep differential pressure on the pilot stem within the design range. The Series B-3 includes a replaceable cartridge containing every moving part of the main or master valve. The solenoid can be completely disassembled, and coils for 115, 230, or 460 volts and for either 25 or 50/60 cycles are available as standard. One size of pilot head is said to fit all five sizes of master valve from 3/8 through 1 1/4-inch I.P.S.

MICR  FLAT

BLACK GRANITE SURFACE PLATES

Present an absolute continuous bearing surface, finished up to 50 millionths inch. Incredibly smooth. Falling objects do not cause humps. Being harder than

hardened steel, can take greatest mis-treatment without causing inaccuracy of surface. No oiling. Will not rust or warp. No re-scraping. Most durable.

COLLINS MICROFLAT CO., 2326 E. 8TH ST., LOS ANGELES 21, CALIF.

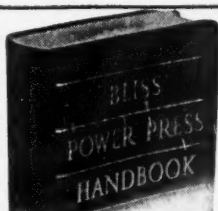
PERFECT PRECISION

Avoid substitutes  
Immediate delivery in most  
sizes from 9x12 to 48x144.

REQUEST BULLETIN

and name and address of  
Distributor nearest you.





**Have you  
bought  
your  
copy?**

"One or Several Are Needed  
in Every Stamping Shop . . .

**American Machinist**

**700 pages • 450 illustrations**

Sections on: Computing press jobs • Selecting proper press • Useful engineering tables • Die illustrations • Complete glossary • Plus a service section for Bliss presses. \$7.50.

**E. W. BLISS CO.**

(Handbook Department)

1368 Raff Rd., S.W., Canton, Ohio

Rush me a copy of the Bliss Power Press Handbook

I am enclosing \$7.50. Bill me.

## FOR SMALL JIG BORING

**PUT SMALL JOBS ON THIS**

## LINLEY MACHINE

and save your larger machines for heavier work.

**YOU'LL BE  
SURPRISED!**

at the extremely low first cost and the vitally important jobs that this little precision machine can do. It will pay you to get our accuracy information on this machine which has 6" x 10" table movement and 7" x 17 1/2" table size.

**Write TODAY For  
Bulletin J**

**LINLEY BROS.  
COMPANY**

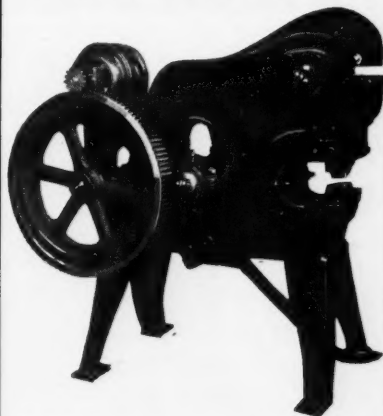
663 State St. Ext.  
Bridgeport 1, Conn.



## Beloit Combined Power

**Punches and Shears  
PROVIDE . . .**

- **Simplicity of Operation**
- **Fast Action**
- **Profitable Performance**
- **Long Service at Low Cost**



• Built in seven sizes, these rugged punches and shears are equipped with punching attachment, adjustable stripper, back gauge and shear blades for flat and round bars. Quick acting four jaw clutch provides for a clutch engagement at every quarter turn of the main gear . . . means faster operation. Can be arranged for notching and coping angles. Will handle many other special jobs most efficiently at low initial and operating cost.

**Write for Catalog No. 14E**

**HENDLEY & WHITEMORE CO.**

110 Blackhawk Blvd. Beloit, Wis.

**Builders of Punches, Shears and Bending  
Rolls since 1900**

## Roll Marking Machine Is Suited for High Production Marking

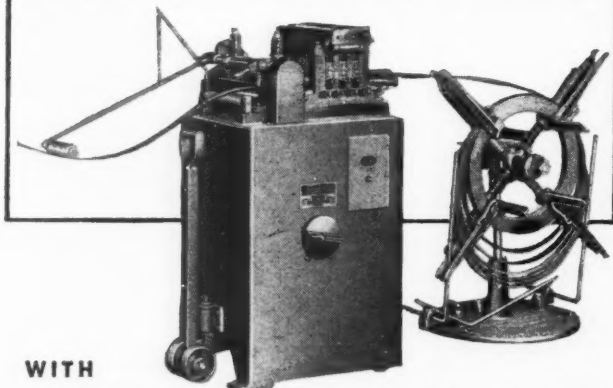
Said to be especially suited for manufacturers with large quantities of component parts which vary in size and shape and require permanent marking, the Noblewest Fully Automatic General Purpose Roll Marking Machine illustrated herewith has been announced by Noble & Westbrook Mfg. Co., 25 Westbrook St., East Hartford 8, Conn. In addition to complete pneumatic operation, the machine features a special electro-pneumatic circuit with an electronic cycle timer for automatic continuous operation that re-

quires the operator to simply load and unload parts. To further increase production, the machine can be readily equipped with a rotary feed, air vise, or air-operated ejection device.

The basic machine features an air-operated work table which provides marking pressure and allows compensation for dimensional variations in workpieces. The depth of mark is controlled entirely by air pressure as preset at the pressure regulator. The machine also has an air-operated die slide in which the marking die is held. The unit can be set for semi-automatic or automatic operation, as required. For single-cycle operation, a master foot

control is provided at the base of the machine. For automatic operation, a master switch is closed to energize

## STRAIGHTEN COIL STOCK FOR PRESSES, SHEARS OR SLITTERS



## WITH LITTELL Variable Speed STRAIGHTENING MACHINES

Output rises, costs drop when coil stock is fed to the press, the shear, or the slitter through a Littell Straightening Machine. Coil stock comes out of a Littell Straightener flat, with curvature removed. Equipped with variable speed transmissions, Littell Straighteners are easily adjusted to meet a wide range of speed requirements. Thirteen medium and heavy duty models straighten coil stock of all standard widths and thickness.

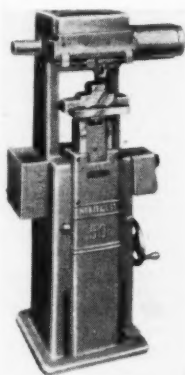
F. J.

**LITTELL  
MACHINE CO.**

WRITE FOR CATALOG

ROLL FEEDS • DIAL FEEDS • STRAIGHTENING  
MACHINES • REELS • AIR BLAST VALVES  
District Offices: Detroit, Cleveland

4163 N. RAVENSWOOD AVE. • CHICAGO 13, ILL.

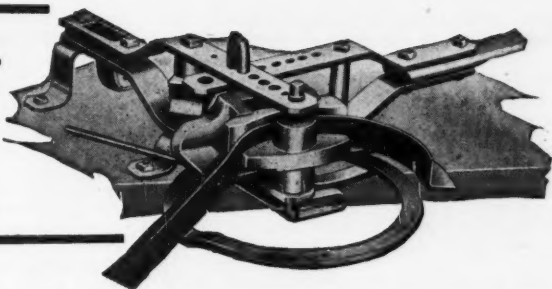


Noblewest Fully Automatic General Purpose Roll Marking Machine

the electronic timer, which will cycle the machine continuously.

The machine is equipped with a combination air-controlled unit which includes an air-line filter, pressure regulator, pressure gage, and air-line lubricator. The unit is furnished with a com-

**ONE MAN...**  
bends 2" x 2" x 3/16"  
**Angle Iron**  
**EASILY ...**



**with the . . . HYDRAULIC POWERED  
HOSSFELD UNIVERSAL IRON BENDER**

Hydraulic unit provides plenty of bending power at your fingertips for smooth effortless bending. Reduce hand labor . . . speed up work . . . improve quality of bends. Fast and accurate, the Hossfeld Hydraulic Bender handles rounds, flats, pipe and angle iron. Forms rings, coils, "U" and "S" bends, eyebolts, spring eyes, etc. Gain higher production with lower labor costs.

*Write NOW . . . for Complete Details!*

**HOSSFELD MANUFACTURING COMPANY**

DEPT. MMS • WINONA, MINNESOTA

Six Sizes  
Available

All Have  
POWER  
Feed for  
Facing!

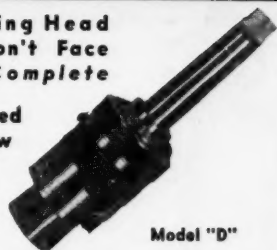


WRITE  
for Complete Details

**THERE'S A FASTER  
AND BETTER WAY  
to Bore and Face**

• A Boring Head  
that Won't Face  
is Not Complete

Re-designed  
Many New  
Features



Model "D"

**CHANDLER TOOL COMPANY**  
Muncie, Indiana

**Chandler**

COMBINED  
BORING  
& FACING  
TOOL HEADS

**Duplex**

plete operational manual; complete tooling, including die holders, marking dies, and work-holding fixtures for all marking applications, can be provided.

### Tapping Attachment Provides High Production

Said to permit tap holes to be machined at a cutting speed of 300 f.p.m. and blind holes to be tapped in light metal at spindle speeds up to 2,500 r.p.m., the S.P.V. Tapping Attachment now being marketed by Eric S. Johnson Co., Dept. MMS, 230 E. Ohio St., Chicago 11, Ill., is designed so

that axial stress on the tap is minimized, thus reducing the danger of tap breakage to a minimum. The necessary torque, which is conveniently adjusted on a graduated scale, is transmitted through a mechanical locking device comprised of steel balls and springs.

The attachment incorporates a reversing device which permits rapid reverse action through the medium of a specially designed radial bearing. The reversing clutch is mechanical in operation. Reversal of rotation is entirely automatic. When the tap reaches the bottom of a blind hole, the attachment reverses as soon as the drill spindle starts to back.

The holder then has a left-handed rotation for a normal right-hand threaded hole, returning to right-handed ro-

## Measure Pitch Diameter with the **NEW** **SCULLY** 3-WIRE THREAD GAUGE



Only  
**\$4.95**

Patent applied for

**NO LOST TIME FUMBLING WITH LOOSE WIRES. ONE SUBTRACTION GIVES PITCH DIAMETER.**

One hand holds and locates the three wires comfortably. Each unit is calibrated and uses "Best Wire Size" for one pitch. Measures any diameter up to 2½". Tolerance-plus .0000, minus .0002".

Available in following American Standard Pitches: 32, 28, 27, 24, 20, 18, 16, 14, 13, 12, 11, 10 threads per inch.

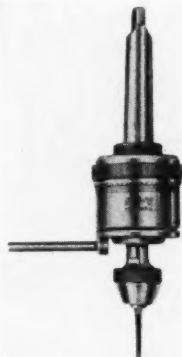
Each gauge for one pitch only.

ORDER DIRECT FROM:

**SCULLY MACHINE COMPANY**

62 Walter Street

Bridgeport, Connecticut



S.P.V. Tapping Attachment

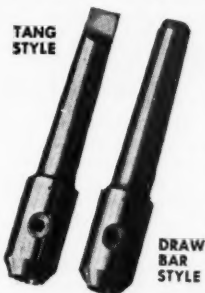
tation when the tap leaves the hole.

The S.P.V. Tapping Attachment is available in five models as follows: Model SAR-00 with capacity of No. 0 to No. 5; Model SAR-0 with capacity of No. 4 to ¼ inch; Model SAR-1 with capacity of No. 10 to ½ inch; Model SA-2C with capacity of ½ to 1½ inches; and Model SA-3C with capacity of ½ to 1½ inches; and Model SA-3C, 1 to 2 inches.



## END MILLS and HOLDERS — by Reltool

Precision processed of finest high speed tool steel, and scientifically heat treated for long cutting life . . . Reltool End Mills are famous for long cutting life. Available in single- and double-end types, in small and large diameters, with 2, 3, and 4 flutes, with straight or ball ends, in over 1000 stock sizes.



● RELTOOL END MILL HOLDERS are made in both Tang and Draw Bar Style, and with Morse or Brown & Sharpe Taper. Sizes over  $\frac{3}{4}$ " have Dual Set Screw. For complete list of sizes and prices see Reltool Catalog No. 50 and latest Discount Sheet.



4540 W. BURNHAM ST. • MILWAUKEE 46, WIS.



## "YANKEE" VISES



*hold the  
work*

*all the way through*

● With a "Yankee" Vise you align the work just once, no matter how many steps the job takes. Lifts on and off a swivel base. Use it on the swivel base for bench work. When removed, it is ready for use on milling machine, or drill press. Accurately machined top, bottom, sides and front end. Makes handy, economical jig. V-grooved block for round stock. Four convenient sizes of "Yankee" Vises, with or without swivel base . . .  $1\frac{1}{2}$ ", 2",  $2\frac{3}{4}$ " and 4" jaw widths. Your industrial distributor has them.



V-grooved block

YANKEE TOOLS NOW A PART OF

**STANLEY**

THE U.S. TOOL CO.

THE TOOL BOX OF THE  
WORLD

**NORTH BROS. MFG. CO.**  
Philadelphia 33, Pa.

Write for Industrial Booklet—Time-Saving  
"Yankee" Spiral Screw Drivers.

## Alloy Is Primarily Intended for Brazing "Hard-to-Wet" Carbides

Handy & Harman, 82 Fulton St., New York 38, N. Y., has developed a metal joining composition, to be known as "EB" Silver Brazing Alloy, which is primarily intended for use in brazing chromium carbide, cast carbides, and other "hard-to-wet" carbides. Effective results are said to have also been obtained on high tungsten-copper alloy, cer-mets, and other difficult-to-braze refractory alloys.

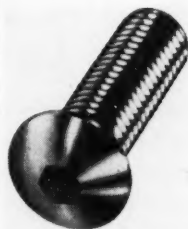
EB Silver Brazing Alloy is composed of 57 per cent silver, with the balance of the composition including copper, man-

ganese, and tin. The alloy has a melting point of 1,120 deg. F. and a flow point of 1,345 deg. F. In addition, the alloy, it is claimed, contains no volatile elements—an important factor in vacuum applications—and is non-susceptible to dezincification type of corrosion.

## Button-Head Socket Screw

A button-head socket screw designed for use where streamline appearance and high strength are desired has been added to the SPS Unbrako line of screws marketed by Standard Pressed Steel Co., Box

556, Jenkintown 22, Pa. Made of alloy steel and heat treated, the screw is available in seven thread diameters as follows: No.



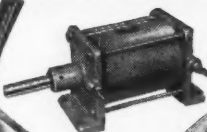
SPS Unbrako Button-Head Socket Screw

8 (0.164 inch), No. 10 (0.190 inch),  $\frac{1}{4}$  inch,  $\frac{3}{8}$  inch,  $\frac{1}{2}$  inch,  $\frac{3}{4}$  inch, and  $\frac{1}{2}$  inch. All sizes except the  $\frac{1}{2}$  and  $\frac{3}{4}$ -inch sizes, which are produced in the National Coarse series only, are available in both National Coarse and National Fine threads. The different diameters, all threaded to the head, are supplied in four to seven lengths. Threads are precision rolled.

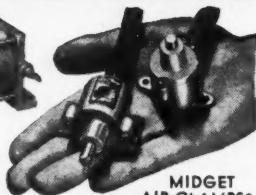
# NEW MEAD INDUSTRIAL AIR POWER CATALOG Ready!



WORK FEEDERS



AIR CYLINDERS



MIDGET  
AIR-CLAMPS\*



AIR  
VISES



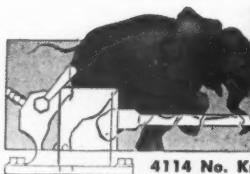
AIR  
PRESSES

*Full of Suggestions  
for* **FASTER, CHEAPER  
PRODUCTION!**

Illustrates, describes Air Cylinders, Valves, air operated Presses, Vises, Chucks, Hammers, Drill Press Feeds, Work Feeders, Timers, semi-automatic combinations, etc.

\*Pneumatic Cylinders.

**Write for Complete Catalog!**



# MEAD

SPECIALTIES COMPANY

4114 No. Knox Ave. Dept. AA-92 Chicago 41, Ill.

## The New "UTILITY"



### MARKING OUTFIT

Nine sizes of type stamped with the same holder—furnished in sturdy wooden box—for all interchangeable marking.

*Write for Literature.*



1051 CHATEAU STREET

PITTSBURGH 33, PA.

## SOMETHING NEW UNDER THE SUN



Finished holes  $1\frac{1}{2}$ " to  $11\frac{3}{4}$ " diameter to a depth of 8" in one rapid operation on your present equipment with

### THE BOREMASTER

Not just another Trepanning Cutter but a real heavy duty tool. Stock removed in one piece eliminating waste.

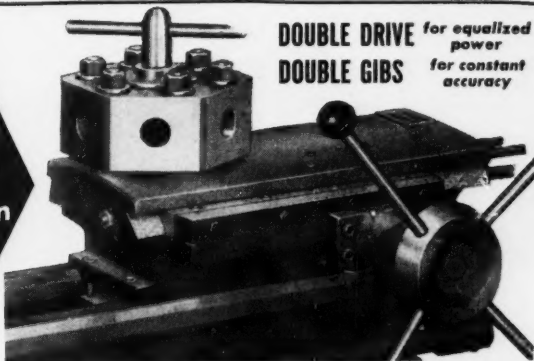
**TIME SAVINGS + MATERIAL SAVINGS  
= COST SAVINGS**

For full details write

**KARL A. NEISE**

381 - 4th Ave., Dept. MM5, New York 16, N. Y.

**Enco**  
Self-Indexing  
**HEXTURRET**  
For Lower Production  
Costs and Speedier  
Output



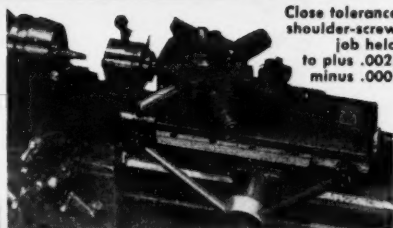
**DOUBLE DRIVE** for equalized power  
**DOUBLE GIBS** for constant accuracy

- ✓ Custom built to fit all lathes from 9" to 18".
- ✓ Smooth, sensitive control with Pilot wheel drive through twin gears and racks.

- ✓ All bearing surfaces hand scraped.
- ✓ All parts of indexing mechanism hardened, assuring accuracy.

SEND FOR CATALOG No. 50A

Also manufacturers of Enco Turret Tool Posts for all Lathes, and "MITI-MITE" Magnetic Base Tools.

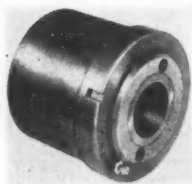


Close tolerance shoulder-screw job held to plus .002; minus .000.

**ENCO Manufacturing Co., Dept. 192**

4524 W. FULLERTON AVE., CHICAGO 39, ILL.

**Reasonable Deliveries**



Jergens Pilot Bearing Bushing

### Pilot Bearing Bushing

J. G. Jergens Co., 11106 Avon Ave., Cleveland 5, Ohio, has announced a pilot bearing bushing which is claimed to provide a complete life-time seal against damaging grit and dust. According to

the manufacturer, the entry of grit or dust into the outer seal actually increases the

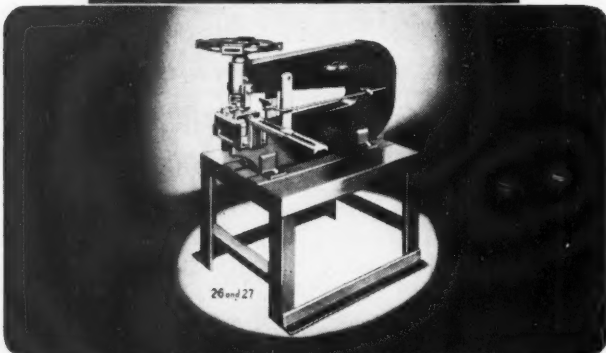
effectiveness of the seal. The cartridge-type design of the bearing holder is said to protect against thrust, as well as radial, loads and offers maximum bar support due to the overall length of the bushing.

With the bushing, tapered bearings can be adjusted to compensate for wear and are adaptable to accommodate movable slip bushings as well as keys and keyways. Applications for the bushing include steady rest and back-up rolls; internal centerless grinder pressure rolls; grit blasters; tumbling barrels; foundry equipment; road and farm equipment; heavy duty construction and well drilling equipment; and conveyor rollers.

## WHITNEY METAL

TOOL COMPANY

41 YEARS EXPERIENCE



### WHITNEY-JENSEN

Nos. 26 - 27

#### PUNCHES

The ball-bearing screw press principle is here applied to a large, hand-operated punch mounted on a sturdy floor stand. Full throat depth for work in sheets; with tie-plates, throat depth is decreased and capacity increased. Capacity, full throat depth, mild steel (No. 26) 2" thru 3/32"; (No. 27) 2" thru 1/16". Capacity, with tie-plates, 1/2" thru 3/8", both models. Send for our new catalog.

WHITNEY METAL TOOL COMPANY

110 FORBES STREET, ROCKFORD, ILLINOIS

### Cone Drive Tapping Chuck

Errington Mechanical Laboratory, Inc., Staten Island 4, N. Y., has introduced a cone drive tapping



Errington Size No. 000 Cone Drive Tapping Chuck

chuck of small, compact, lightweight design featuring interchangeability of shanks. Claimed to operate most efficiently at high speeds, the chuck has an oil-resistant celeron cone and is equipped with needle

## IT'S HERE! A LOW PRICE *Automatic* COIL CRADLE

Medelton  
Motor  
Driven

# "Powerroll"



**\$270.00**  
F.O.B. N.Y.  
800 LBS. CAP.

### FEATURES . . .

- Eliminates hazards of lifting heavy rolls.
- Roll on your coil and it's ready to go.
- Slack loop prevents drag on feed or dies.
- 30% to 40% higher daily production on hand or automatic feeds.
- Re-loading time kept to a minimum.
- No pulling of coils, avoids operator's fatigue, and results in faster feeding.

Write for circular. • Dealer inquiries invited.

**\$357.00**  
F.O.B. N.Y.  
2000 LBS. CAP.

**WM. HALPERN & CO., INC.**  
Machine Tools

53 PARK PLACE 245 CONNECTICUT AVE.  
NEW YORK 7, N. Y. BRIDGEPORT, CONN.

**tapped parts  
pass  
inspection**

the new  
lead screw  
tapping  
attachment used with  
any  
standard  
reversing  
head

*when you use-*  
**"Auto-tap"**

Excellent for production tapping.  
Write for illustrated literature  
and price lists.

**Automatic Methods** INC.

PRECISION PARTS FOR THE AIRCRAFT INDUSTRY

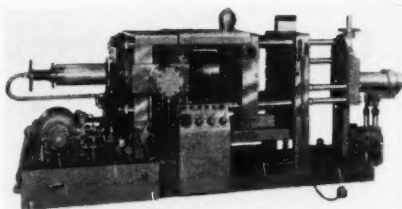
42 Walnut St., Bldg. 188, Newark 2, N. J.

bearings at both the top and bottom of the main spindle.

Extremely sensitive with minimum play between drive and reverse, the chuck is sturdily constructed for high production tapping and is available with collet chuck or Jacobs "Rubber-Flex" tap chuck. It is offered in three sizes as follows: Size No. 000 with capacity for taps from 0 to No. 10; Size No. 00 with capacity for taps from  $\frac{1}{8}$  to  $\frac{1}{4}$  inch; and Size No. 0 with capacity for taps from No. 10 to  $\frac{1}{2}$  inch.

### **Cold Chamber Die-Casting Machine Develops and Maintains 40,000-Lb. Pressure**

A precision-built cold chamber die-casting machine which is said to develop and maintain a 40,000-lb. pressure without opening of die faces and flashing is now being marketed under the name of "Wedgelock" by Cuyahoga Industries, 17920 Waterloo Rd., Cleveland 19, Ohio. Dies with  $7\frac{1}{2}$ -inch deep cavities can be operated with an opening up to 15 inches maximum. Dies with shallow cavities can be operated at a 10-inch opening for fast-



"Wedgelock" Cold Chamber Die-Casting Machine

er cycling and increased output. The die opening can be set at any point from 10 to 15 inches. A motorized central screw adjustment regulating die height makes possible adjustments to 0.001 inch.

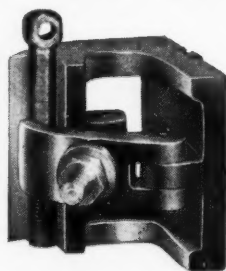
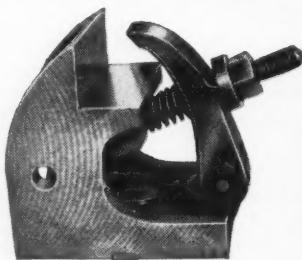
According to the manufacturer, castings produced with the machine are solid and non-porous since the pump delivering oil to the shot cylinder has an adjustable relief valve permitting adjustments from 1,000 to 2,000 p.s.i. and also because powerful hydraulic cylinders ensure positive locking. Designed for easy operation, the machine also features heavy duty construction and a central hydraulic ejector cylinder.

## **HART MILLING FIXTURES**

### **"Masters of 1000 Setups"**

**ELIMINATE 1000 NEEDS FOR SPECIAL—EXPENSIVE JIGS & FIXTURES**

**ORDER  
THEM  
IN PAIRS**



**VERTICAL  
USE FOR  
STRADDLE  
OR END  
MILLING**

**HART MILLING FIXTURES** are popular and profitable to use in any shop—are used in either horizontal or vertical position. Will hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on bottom as well as on back. Generally sold in pairs. Made in 4 sizes—to hold stock from  $\frac{1}{2}$  to 5 inches.

**WALTER W. FIELD & SON, INC., 50 Hayward St., Cambridge 42, Mass.**

**Accurate Hole Transfer Made Easy With  
NIELSEN TRANSFER SCREWS**

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from  $\frac{1}{8}$ " to  $\frac{3}{4}$ " U.S.S. Inexpensive — Last for years.



Write for Circular  
**NIELSEN TOOL &  
DIE COMPANY**  
P. O. Box 1067  
Berkley, Mich.



**DRILL and  
PILOT  
BUSHINGS**  
*Frictionless  
— Rotary*

For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch.

**GATCO ROTARY BUSHING CO.**  
42330 Ann Arbor Road, Plymouth, Michigan

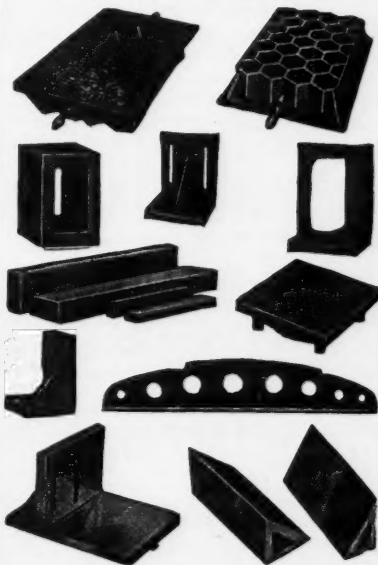


**Co Clark**  
**ADJUSTABLE  
HOLE  
CUTTER**

Finished cuts the first time in boiler plate, pipe, plastics, hard fibre, stainless steel, Transite, etc. 7 models cut variable expansions from  $\frac{3}{8}$ " to 5" holes, with thickness capacities from thin sheets to 1".

**ROBERT H. CLARK COMPANY**  
Beverly Hills, California MM-9  
*Manufacturers of Precision Cutting Tools*

# DEPENDABLE ACCURACY



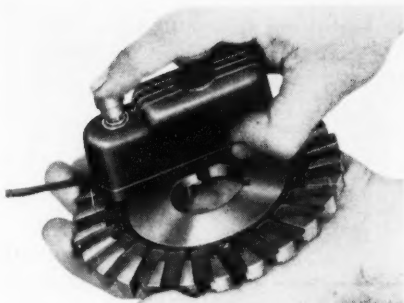
INSPECTION TOOLS made of MEEHANITE METAL are designed to fill your various Inspection and Checking needs. Sturdily constructed to give you reliable, accurate service.

**Surface Plates — Box Parallels**  
**Slotted Angle Plates**  
**Universal Right Angles**  
**Flat Parallels — Lapping Plates**  
**Toolmakers' Knees — Straight Edges**  
**Masterangle Plates—**  
**Angle Attachments**  
**Surface Plates Rescaped**  
**Send for Bulletin**

**ACME TOOL CO.**  
73 W. Broadway, New York 7, N. Y.

## Unit Demagnetizes Tools and Parts

Known as the "Miti-Mite" Demagnetizer No. 500, a portable instrument has been announced by Enco Mfg. Co., Dept. 17, 4524 W. Fullerton Ave., Chicago 39, Ill., which is said to thoroughly demagnetize tools, dies, parts, pieces, and so on, by merely sliding it over the surface of the item to be demagnetized. The unit consists of a base in the form of a small block, and an extension cord. The base is made of non-breakable molded plastic—



"Miti-Mite" Demagnetizer No. 500 in use



# CAMS

Specialists in Cams  
Single or in Production  
ROWBOTTOM EQUIPMENT

Send Specifications for Quotation  
**L. G. SCHLECHT & SON, INC.**  
Est. 1919  
1628 N. Astor St. Milwaukee 2, Wis.

## HAND TAPPING

with  
MACHINE  
PRECISION



Adapts for  
**LATHE**

## 59<sup>50</sup>

F. O. B.  
ST. PAUL

Just slip a tap adaptor into the Dahlstrom Tap Guide and twist. Your hand tapping will be quick and accurate. For machine tapping, the spindle top is center-bored to fit the tail stock center of a lathe. Size 13" x 8" x 14". Included 9 adaptors (8/32 to 3/4"). Taps not furnished. Dahlstrom Mfg. Co., 5601 Woodlawn Blvd., Minneapolis 17, Minn. Write for Pamphlet—Also shows Chucks & Autostops.

**Dahlstrom TAP GUIDE**

1 1/4 inches wide x 4 inches long x 1 1/4 inches high. On top of and toward the front of the base in an offset is a single pole momentary action switch which is normally open. This switch resembles a push button and is easily pressed with the forefinger while holding the unit. In the bottom of the base are three poles of laminated silicon steel, flush with the bottom surface.

The cord included with the unit is 6 feet long, oil resistant, and equipped with a soft rubber plug. In use, the "Miti-Mite" Demagnetizer No. 500 is plugged into a 110-volt a.c. outlet and then placed on top of the part to be demagnetized, the action switch pressed, and the device moved slowly over the surface of the part. Because of the plastic case of the demagnetizer and absolutely flush position of the bottom poles, sliding of the unit over highly polished surfaces will not mar or scratch, it is claimed. In addition, due to its small size, the unit may be used effectively in the cavities of die cast molds or employed to remove stray magnetism collected in punches or stamping dies.

.....**CARROLL**.....

**DIVIDING HEADS**



Catalog  
on  
Request

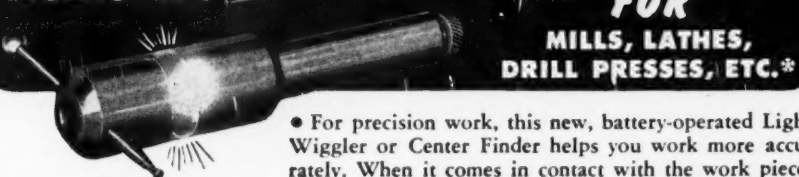


**3 SIZES — 4 MODELS — 6" to 12"**

**CARROLL DIVIDING HEAD CO.**

3325 Cardiff Ave., Cincinnati 9, Ohio

## NEW WIGGLER gives ACCURACY that LIGHTS UP!



**FOR  
MILLS, LATHES,  
DRILL PRESSES, ETC.\***

### \*Many Uses:

Centers and locates bores •  
Truing deep holes • Locates  
spindle centers • Centers lines  
and punch marks • Sets re-  
cesses inside bores • Use it,  
also, with Height and Surface  
gages • Lights up upon contact!

• For precision work, this new, battery-operated Light Wiggler or Center Finder helps you work more accurately. When it comes in contact with the work piece, it automatically lights to give you greater accuracy (within .0001), to eliminate guesswork and to lessen eye strain.

*Use it once just in locating working points, in slot and hole centering—and you will always want one at each bench.*

**ORDER DIRECT**  
Send check or M. O.

**\$9<sup>95</sup> EACH**

(INCLUDES BATTERY  
AND LIST OF USES)

Full satisfaction guar-  
anteed — Discount on  
Quantity Orders.

**ART-MIL MACHINE & MFG., INC.**

170 HOSACK STREET  
COLUMBUS 7, OHIO

## YOUR "SPECIAL BUSHINGS" May Be Our Regular STOCK ITEMS!



### Ready for Immediate Delivery

TWO complete bushing standards, the A.S.A. Standard plus our own Acme Standard, enables you to obtain bushings from stock that might otherwise require special manufacture. Results in faster delivery, lower cost. Write for catalog.

**A**ccurate  
**I**nterchangeable  
**C**oncentric

**Acme Industrial Company**

Makers of Hardened and Ground Precision Parts  
212 N. Laffin Street • Chicago 7, Illinois

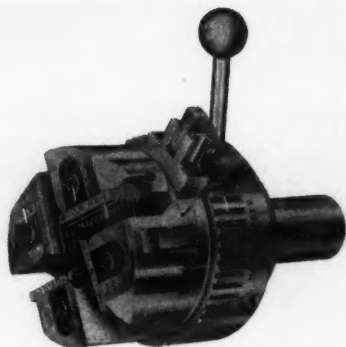


THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS

## Self-Opening Die Head Has Range from No. 4 to 5/8-Inch Diameter

The 5 HH "Landmatic" Head announced by Landis Machine Co., Waynesboro, Pa., is described as a stationary self-opening die head with a range from No. 4 to 5/8-inch diameter and designed for application to turret lathes, hand screw machines, and automatic screw machines employing a stationary type head. The head has a small number of working parts which are made of a special alloy steel.

Designed to provide a positive locking



5 HH "Landmatic" Die Head

**SEND FOR FREE CATALOG TODAY**



**T-NUT & STUD SETS  
STEP BLOCK SETS  
PUNCH PRESS SETS**

**QUARTER TURN SCREWS  
SHOULDER SCREWS  
DOUBLE END JIG FEET  
SCREW TYPE JIG FEET  
PRESS TYPE JIG FEET  
FLANGED NUTS  
CUT THREAD STUDS  
TEE-NUTS  
COUPLING NUTS  
ADJUSTABLE STEP BLOCKS  
STAR TYPE HAND KNOBS  
HEXAGON TYPE HAND KNOBS  
KNURLED HEAD SCREWS**

**Northwestern**  
119 HOLLIER AVE., DAYTON 3, OHIO

**Micro Supreme**  
**LAY-OUT AND IDENTIFICATION DYE**



**7 COLORS**

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

**MICHIGAN CHROME & CHEMICAL COMPANY**  
6340 E. Jefferson Ave. • Detroit 7, Mich.

action, a new size adjustment mechanism incorporated in the head consists of a pivoted latch which is held in engagement with notches on the adjusting ring by spring tension. To adjust the head, the latch is depressed and the adjusting ring is rotated manually the required amount. The notches are located on the adjusting ring in such a manner that a movement of one notch will provide a corresponding movement of 0.001 inch on the pitch diameter of the workpiece.

Opening action is obtained by interrupting the forward travel of the turret slide or carriage. If the "pull-off" opening action is not desired, the head may be opened by hand. Closing of the head is achieved by hand. Chaser holders operate in dovetail slots in the head body. For cutting left hand threads, left-hand chaser holders are required; however, no other changes are necessary for left-hand threading, and the same chasers may be employed for both right and left-hand work by merely grinding the proper cutting angles at both ends of the chasers.

**FLYNN**



**FOR OVER 30 YEARS  
THE PREFERRED  
OFFSET BORING HEAD**

**Write for Catalog**

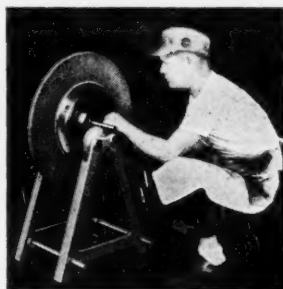
**FLYNN MANUFACTURING CO.**  
133 HOWARD AVE. • DETROIT 20, MICH.

## Use *Anderson* BALANCING WAYS No Leveling Required

With Anderson Balancing Ways it is easy to balance any rotating object in a fraction of the time formerly required by other methods. Simply place the Ways on the floor or bench and they are ready to use without adjustments of any kind.

The revolving, chilled iron discs and the spindles, are ground and balanced to extreme accuracy. Spindle bushings are hardened—glass hard—yet without danger of breaking. This eliminates the possibility of wear or ball bearing indentations on spindles or bushings when heavy weights are placed on the ways.

They save time, save labor, and assure better work.



Swing	Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

Write for Bulletin 9-22

**ANDERSON BROS. MFG. CO., Rockford, Ill.**

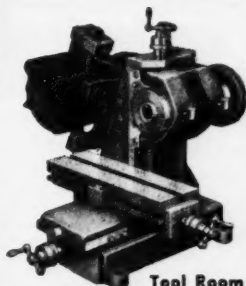
*Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters, Hand and Power Hydraulic Straightening Presses.*

## The BARKER "MILLER"

Will Efficiently Handle  
"101 TRICKY"

Second Operation Jobs  
on SMALL PARTS  
ordinarily requiring  
larger, expensive  
milling machines

Production  
Model



Tool Room  
Model

3 Micrometer feed screws.  
Ideal for instrument mfgs. and tool and die shops.

The Barker exclusive 3-way travel feature affords versatility of operation.  
Rapid production rate with inexperienced help. Easy set-up for small run jobs.  
Compare Barkers "plus" features with other small "millers," then decide.

TYPICAL END  
MILL OPERATION  
UTILIZING HEAD  
MOVEMENT ONLY

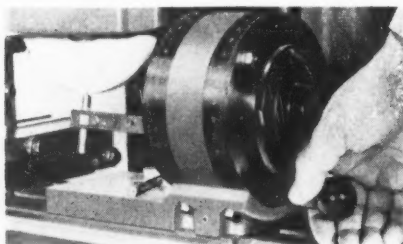
Dealers Write for Proposal

WRITE FOR  
LITERATURE AND  
COMPLETE  
INFORMATION

**BARKER ENGINEERING COMPANY** 500 GREEN ROAD CLEVELAND 21, OHIO

## Continuous Radius and Tangent Wheel Truing Attachment

Brown & Sharpe Mfg. Co., Providence 1, R. I., has announced an attachment



Brown & Sharpe Continuous Radius and Tangent Wheel Truing Attachment

that is designed to form, with one continuous movement of the diamond, accurate radii on grinding wheels with accurate tangents at either or both sides of the radii. Convex radii up to  $\frac{1}{2}$  inch with tangents to  $\frac{1}{8}$  inch in length at any angle, from 90 degrees above horizontal to 20 degrees below, can be formed; concave

radii for  $\frac{1}{8}$  to 1 inch (with diamond tool furnished) having tangents up to  $\frac{1}{8}$  inch long at any angle, from 90 degrees below horizontal to 20 degrees above, can also be formed.

The attachment is firmly clamped to the machine table by a single T-bolt. Accurate alignment is assured by two reversible tongues for T-slots  $\frac{1}{2}$  or  $\frac{3}{8}$  inch wide. When truing a convex form, the angle of the tangent at the front of the wheel is controlled by the angular setting of the adjustable plate at the left side of the attachment body; the angle of the tangent at the back of the wheel is controlled by the setting of the plate at the right of the body. When truing a concave form, the left-hand plate controls the rear tangent and the right-hand plate the front tangent. Verniers on the plates and matching scales on the attachment body facilitate the setting. Two clamp nuts on each plate maintain the angular setting. A gage provided, used in conjunction with a micrometer, permits setting the diamond to form an accurate radius on the grinding wheel. After the attachment is properly set, the diamond is brought into contact with the grinding wheel and the wheel is accurately formed to the desired shape by turning the easily operated crank at the right.

### A BETTER BORING BAR

OUR fine list of Customers is PROOF that our method of broaching square holes makes a better fit for the tool bit. This means more rigidity and longer life especially with tungsten Carbide. We also make bars for our Type B and Type C cutters or a combination of tool bits and cutters. Bars are made to suit customers' requirements as to method of drive, pilot, number of holes, angle of bit, etc. Our two-bladed cutters can be floated in the bar or held rigidly. Cutters are interchangeable—hence can be ground in an arbor in the tool room and only require a few seconds for inserting in the bar. Square hole sizes range from  $\frac{1}{8}$ " up to and including  $\frac{3}{4}$ ".

**THE DETROIT BORING BAR CO.**  
688 E. FORT ST. Detroit 26, Mich.

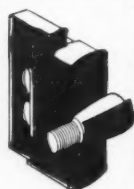
Established



1927

## TYPE "B" AND "C" CUTTERS

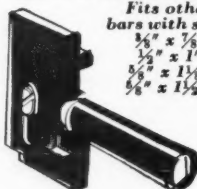
Suitable for Tipping With Tungsten Carbide



"B" A strong rigid serrated 2-bladed cutter—located in the bar with a taper pin. Bore holes accurately to close limits. Can be expanded and reground giving long life. Sizes  $\frac{1}{8}$ " dia. up to 6".

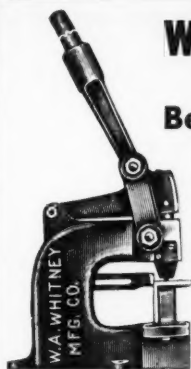


"C" A simple 2-bladed reaming cutter. Can be expanded and reground. Located in the bar by a hardened V. This V never has to be reground as blades are expanded.



Fits other bars with slots  
 $\frac{1}{8}$ " x  $\frac{1}{8}$ "  
 $\frac{1}{4}$ " x  $\frac{1}{4}$ "  
 $\frac{3}{8}$ " x  $\frac{1}{2}$ "  
 $\frac{1}{2}$ " x  $\frac{3}{4}$ "





## WHITNEY No. 91 Bench Punch

A very efficient and satisfactory tool for general use, shop or experimental room.

Depth of throat — 5 inches.

Capacity —  $\frac{1}{2}$  thru  $\frac{1}{4}$  or 2 thru  $\frac{1}{8}$ ".

Notches angles  $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{8}$ .

Punches supplied in rounds, squares, ovals, rectangles or specials. Especially adaptable for experimental work.

Write for catalogue.

**W. A. Whitney Mfg. Co.**

640 Race St.

Rockford, Ill.

**GRANT**

## RIVETERS



• Pioneers in the riveting field. Head rivets from smallest to  $\frac{3}{4}$ " diameter, either by noiseless spinning or vibrating hammer method.— Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature—and don't forget to send samples.

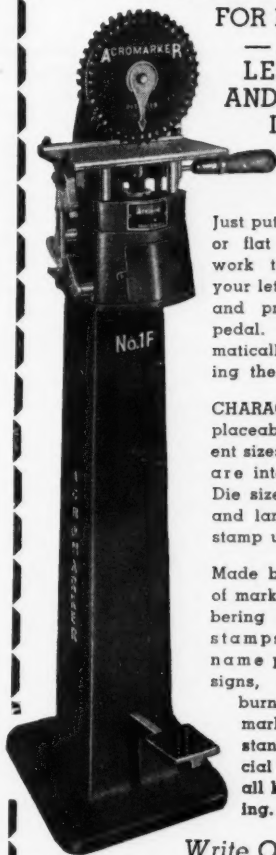
**THE GRANT MFG. & MACHINE CO.**  
96 Silliman Ave. Bridgeport 5, Conn.

## "Just Like People"

POPULAR MACHINES ARE THE ONES YOU LIKE.

TAKE THIS **ACROMARKER**

FOR INSTANCE  
—IT MAKES  
LETTERING  
AND NUMBER-  
ING EASY.



Just put a name plate or flat part on the work table, select your letter or number and press the foot pedal. Spaces automatically or by turning the handle.

CHARACTERS are replaceable and different sizes of die wheels are interchangeable. Die sizes— $\frac{1}{16}$ " to  $\frac{3}{8}$ " and larger machines stamp up to  $\frac{3}{4}$ " size.

Made by the makers of marking and numbering machines, stamps, dies, type, name plates, metal signs, engraving, burning brands, marking inks, and standard or special machines for all kinds of marking.

Write Or See—

*The*  
**ACROMARK**

*Company*

9 MORRELL ST., ELIZABETH 4, N. J.

## Shearing Tool Cuts 14 Gauge Stainless Steel

A metal shearing tool that is designed to cut 14 gauge stainless steel and mild steel up to  $\frac{1}{4}$  inch in thickness has been announced by McCoy Products Co., Inc., 404 Felt Bldg., Salt Lake City, Utah. According to the manufacturer, the tool, which operates on a simple leverage principle, minimizes curling and practically eliminates burring in cutting metal.

## ATLANTIC GEARS

**SPUR  
SPIRAL  
WORM  
BEVEL  
GEARS**  
GENERATED WITH  
PRECISION ON  
MODERN EQUIPMENT

SEND  
SAMPLES OR  
BLUEPRINTS  
FOR  
QUOTATION

**ATLANTIC  
GEAR WORKS, INC.**

198A LAFAYETTE ST. • N.Y. 12, N.Y. CA 6-1440



McCoy Metal Shearing Tool

Designed to cut straight lines, curves, and right angles in metal sheets of various sizes, the tool weighs 9 lb. and is readily portable. It can be easily used in almost any bench vise. Mounted on a specially designed tripod, the tool can also be used as a stationary piece of equipment in the shop.

## Columbia

**TOOL STEELS** for  
all tools for all purposes



**HOT WORK-  
SHOCK RESISTING:**

Formite  
Firedie

Formite No. 2  
Buster C.E.C.

**COLUMBIA TOOL  
STEEL COMPANY**



Main Office & Works  
Chicago Heights 6, Ill.

## Router Provides Unusual Swing Clearance

Said to be ideal for many types of trim-routing operations in non-ferrous metals requiring an unusually great swing clearance, the ECCo No. 434H Horn Router now being marketed by Ekstrom, Carlson & Co., Dept. M-14, 1400 Railroad Ave., Rockford, Ill., can be equipped with either



**DRILL THESE HOLES  
BY A QUICK, EASY, INEXPENSIVE METHOD**  
Your business letterhead will bring literature.  
**WATTS BROS. TOOL WORKS**  
Wilmerding, Pa.

People work better when they SEE BETTER

At Allen B.  
Du Mont  
Laboratories  
Inc. —

*Using Magni-Focuser to inspect the glass neck assembly of a television picture tube*



MAGNI-FOCUSER's matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

## MAGNI-FOCUSER

**SPEEDS PRODUCTION**

**Leaves both hands free to work**

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

**Send for descriptive folder**

**EDROY PRODUCTS CO.**

480 Lexington Ave.,  
Dept. P, New York 17, N. Y.

## COMET

### BORING, FACING, and INTERNAL THREADING TOOLS

For holes from 1/8" upward, 15 different sizes

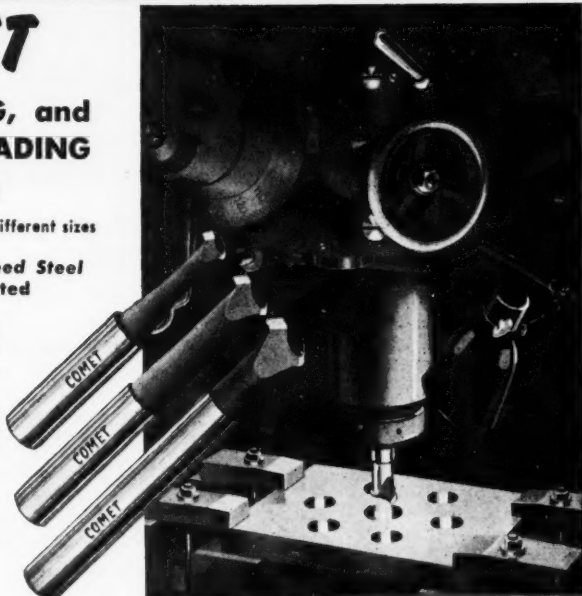
**Made of Super-High-Speed Steel  
Specially Heat Treated**

Indispensable for your JIG BORER. The worm-like spiral of the boring heads provides a long useful cutting surface. Their use insures perfect fitting threads. Correctly designed for precision work.

*Write for complete data.*

**Comet Tool Co.**

738 Broadway  
New York 3, N. Y.



## Shearing Tool Cuts 14 Gauge Stainless Steel

A metal shearing tool that is designed to cut 14 gauge stainless steel and mild steel up to  $\frac{1}{8}$  inch in thickness has been announced by McCoy Products Co., Inc., 404 Felt Bldg., Salt Lake City, Utah. According to the manufacturer, the tool, which operates on a simple leverage principle, minimizes curling and practically eliminates burring in cutting metal.

## ATLANTIC GEARS

SPUR  
SPIRAL  
WORM  
BEVEL  
GEARS  
GENERATED WITH  
PRECISION ON  
MODERN EQUIPMENT

SEND  
SAMPLES OR  
BLUEPRINTS  
FOR  
QUOTATION

ATLANTIC  
GEAR WORKS, INC.

198A LAFAYETTE ST. • N.Y. 12, N.Y. CA 6-1440



McCoy Metal Shearing Tool

Designed to cut straight lines, curves, and right angles in metal sheets of various sizes, the tool weighs 9 lb. and is readily portable. It can be easily used in almost any bench vise. Mounted on a specially designed tripod, the tool can also be used as a stationary piece of equipment in the shop.

## Columbia

**TOOL STEELS** for  
all tools for all purposes



**HOT WORK-  
SHOCK RESISTING:**

Formite  
Firedie

Formite No. 2  
Buster C.E.C.

COLUMBIA TOOL  
STEEL COMPANY

Main Office & Works  
Chicago Heights 6, Ill.



## Router Provides Unusual Swing Clearance

Said to be ideal for many types of trim-routing operations in non-ferrous metals requiring an unusually great swing clearance, the ECCo No. 434H Horn Router now being marketed by Ekstrom, Carlson & Co., Dept. M-14, 1400 Railroad Ave., Rockford, Ill., can be equipped with either



**DRILL THESE HOLES  
BY A QUICK, EASY, INEXPENSIVE METHOD**

Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS  
Wilmerding, Pa.

**People work better when they SEE BETTER**

At Allen B.  
Du Mont  
Laboratories  
Inc. —

*Using Magni-Focuser to inspect the glass neck assembly of a television picture tube*



MAGNI-FOCUSER's matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

## **MAGNI-FOCUSER**

**SPEEDS PRODUCTION**  
**Leaves both hands free to work**

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

**Send for descriptive folder**

**EDROY PRODUCTS CO.** 480 Lexington Ave.,  
Dept. P, New York 17, N. Y.

## **COMET**

### **BORING, FACING, and INTERNAL THREADING TOOLS**

For holes from 1/8" upward, 15 different sizes

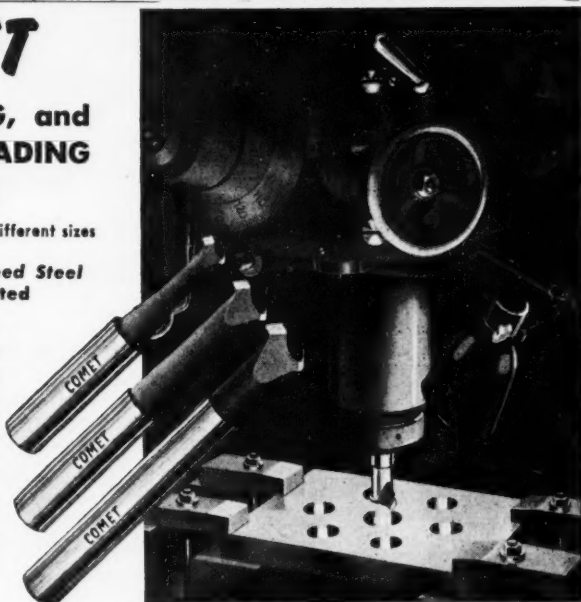
**Made of Super-High-Speed Steel  
Specially Heat Treated**

Indispensable for your JIG BORER. The worm-like spiral of the boring heads provides a long useful cutting surface. Their use insures perfect fitting threads. Correctly designed for precision work.

*Write for complete data.*

**Comet Tool Co.**

738 Broadway  
New York 3, N. Y.



## CUT DRILL SHARPENING AND DRILLING COSTS—50% **BLACK DIAMOND**

### PRECISION DRILL GRINDER—FOR ALL SMALL DRILLS

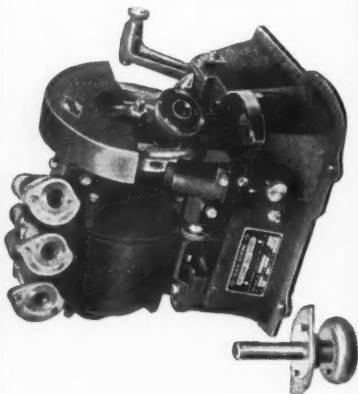
This motor-driven machine cuts grinding and drilling costs 50% and more, saves expensive drill stock, reduces work spoilage and drill breakage, conserves skilled labor.

When you need sharp, small gauge or fractional drills in quantities—it costs money to put an experienced mechanic to work on them.

With a Black Diamond anybody can keep all small drills sharp and ready for any job—with lips accurately ground to exactly the same length, proper angle and with correct clearance for fast, precision drilling. The built-in Diamond Point Dresser keeps the grinding wheel ever sharp cutting and the Web Thinning Attachment cares for all types of Notched points to perfection.

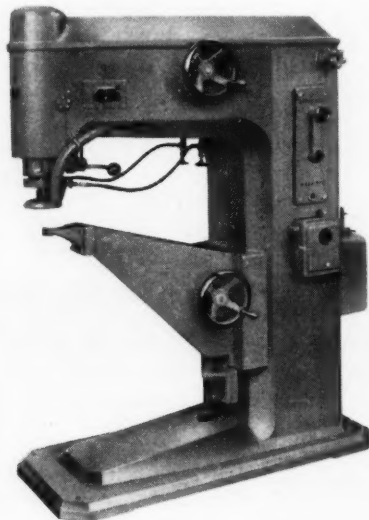
WRITE FOR MORE COMPLETE DETAILS.

**BLACK DIAMOND SAW & MACHINE WORKS, INC.**  
45 NORTH AVENUE, NATICK, MASSACHUSETTS



a 3, 5, or 7½ h.p. 3,600 r.p.m. drive motor. Spindle speeds of either 10,000 or 20,000 r.p.m. are quickly and easily obtained by means of a two-step drive pulley arrangement.

An adjustable 3-position depth stop is built into the machine for precision step-routing. The minimum clearance between the collet chuck and the arm measures 10 inches. One standard pilot bracket and guide is furnished with the machine; however, other pilot brackets and guides



ECCo No. 434H Horn Router

can be designed to special order. An air-operated coolant spray attachment is available as optional equipment.

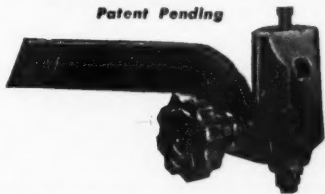
### Universal Joint Has 6-Inch Hub Diameter

Curtis Universal Joint Co., Inc., 10 Birnie Ave., Springfield, Mass., is now producing a heavy duty universal joint with a 6-inch hub diameter and a length of 15½ inches in the single-joint design and 25 inches in the double-joint design. The approximate weight of the single-joint is 98 lb. and of the double joint, 155 pounds.

The Curtis Heavy Duty Universal Joint includes forks cast of alloy steel and pins and blocks of cold drawn alloy steel. All

## Monarch Precision SHAPLANE Radius Tools

Patent Pending



Five Models for

**LATHES, SHAPERS, PLANERS,  
AND BORING MILLS.**

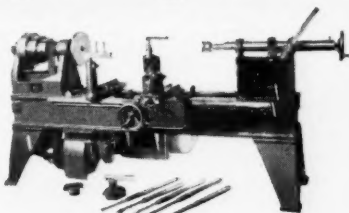
RANGE  $\frac{1}{8}$ " TO 3" RADIUS (MODELS ALSO  
AVAILABLE FOR CONVEX CUTTING, AND  
CONCAVE RADII TO 6" ON PLANERS, ETC.)

**C. B. TEETER**

**Tool Room Specialties**

4470 Oakenwald Ave., Chicago 15, Ill.  
Phone Drexel 3-3571

## "OLIVER" Spinning Lathes



Smoothly spin all metals including sheet steel. Headstock spindle has taper roller bearings with large thrust capacity. Ball bearing live tail center. Made in 12, 16, 20, 24 and 30-inch diameter swing over bed; with plain bed or carriage.

*Write for Complete Details*

**OLIVER MACHINERY COMPANY**  
GRAND RAPIDS 2, MICH.



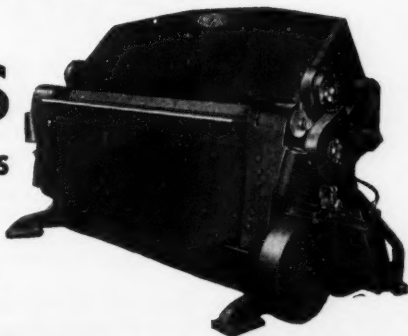
**STEEL HAND and POWER**

## BENDING BRAKES

for Single and Quantity Runs

BENDING STEEL PLATE  
and SHEET METAL

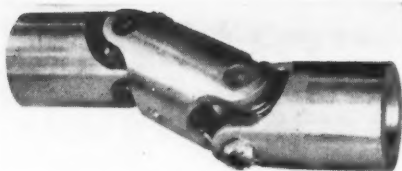
Special Bending Brakes  
Double Folder Brakes



**DREIS & KRUMP**  
MANUFACTURING COMPANY

7418 S. Loomis Boulevard, Chicago 36, Illinois





Curtis Heavy Duty Universal Joint

parts are heat treated and ground for maximum strength and durability, and hubs are machined to user specifications.

A feature of the joint is the ease of assembly and disassembly made possible through the use of a threaded small pin and lock nut. Suggested applications for the joint include steel rolling mills, strip mills, galvanizing plants, and other heavy duty equipment.

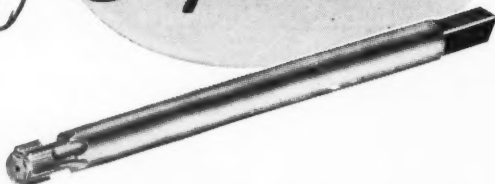
### Sealed Oil Dispenser for Lathe and Grinder Centers

Known as the "Center Lobe Dispenser," a streamlined sealed oil dispenser for the lubrication of centers on lathes and grinders has been announced by H. K. Tool Co., Waukesha, Wis. The unit which can be easily and firmly mount-



In Carbide-tipped  
circular tools  
you can't beat

**Staples QUALITY**



**T**HE Staples Carbide-Tipped Shell Type Expansion Reamer gives greatest economy for all types of hand and power driven line reaming or accurate piloted reaming. To compensate for wear, the reamer shell is expanded by driving it up the tapered arbor.

Wherever precision hole production is required with a high degree of tool accuracy, fine hole finish and long tool life, Staples Tools prove their superiority.

Ask for our recommendations on your requirements for standard or special tools.

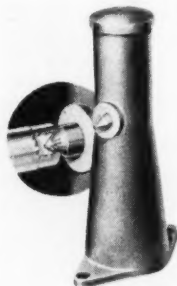
**THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio**

Distributors in Major Cities

**Staples**

**CARBIDE-TIPPED CUTTING TOOLS**

A complete line of Circular Carbide-Tipped Cutting Tools  
Expansion Reamers — Special Tools



H. K. "Center Lobe Dispenser"

ed on a work-bench or machine and becomes a permanent fixture, is designed to afford a quick, clean method of center lubrication.

A pin hole channel is provided down the heart of the center of the dispenser direct to the lubricant storage well. This center is anchored firmly but will depress and release lubricant in a single, quick move-

## MASTERCRAFT Rotary Tables



Write for circulars describing this and other models.

### Model 700-R

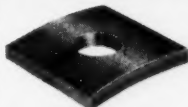
is an improved combination slide and rotary table for use on either the miller table, drill press or lathe face-plate. Table 7 1/2" dia. Rotates through 360°. Height 4 3/4" overall.

**F & M SALES, Inc.**

1054 Cahuenga Blvd.  
Hollywood 38, Calif.

## ELMWOOD SPRING WASHER

For heavy duty under severe conditions of vibration. The perfect spring washer for punch and die hold-downs or any place where nuts and bolts have a tendency to loosen! Ask us for complete details about "Special Applications" to suit your needs!



**STOCK SIZES:**  
3/8" to 1 1/4"

**ELMWOOD MFG. CO.**

3145 Chestnut Street  
Detroit 7, Michigan



## THE CRALEY OFFSET BORING HEADS

- Note depth of bearing.
- Tool carrying block most accurately fitted of any boring head made.
- Large graduated dial screw—easily read calibrations.
- Note minimized overhang.

- Tension screws on opposite sides and ends of block—all cutting strain thrown against solid metal.
- Nine sizes.
- 20 years of Craley experience specializing in boring heads.

Write for illustrated Catalog MS.

**C. C. CRALEY MFG. CO.**

SHILLINGTON

PENNSYLVANIA

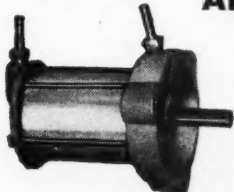


SINGLE ACTING



MICRO

VERTICAL FACE



# AIR-MITE AIR CYLINDERS

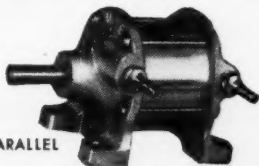
SAVE time, spoilage, cost . . . speed production . . . reduce fatigue . . . on all drilling, reaming, tapping and processing jobs. Available in 1", 1 1/2", 2 1/4", 3", 4" and 5" diameters; stroke length optional. Single or double action; all mountings.

Write for complete catalog of Air Cylinders and Air Arber Presses.

**AIR-MITE**

4417-H West Carroll Ave.  
Chicago 24 • Illinois

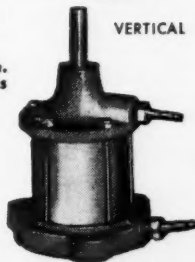
PARALLEL



DOUBLE ACTING  
CLEVIS



VERTICAL



ment as the operator places added pressure on the work or mandrel while holding the work with both hands. The lubricant is sealed in and flushes outward, keeping the center free from chips.

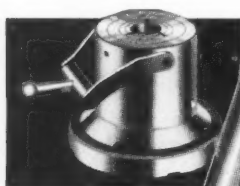
### Slide Feed Operates off Press Crankshaft

Designated as the No. 4060, a slide feed for punch presses announced by Cooper Weymouth, Inc., Bridgeport 8, Conn., is designed to operate off the press crankshaft, converting hand-fed presses to time and labor-saving automatic operation.

The use of light yet sturdy heat-treated castings in the construction of the feed is said to make it easy for one operator to handle. The unit can be set to maintain a high accuracy of feed on long or short runs without overthrows. Ease of setting and adjustment is claimed to make the unit particularly adaptable where a variety of feeds is necessary.

The No. 4060 is designed to accommodate stock up to 4 inches in width and  $\frac{1}{2}$  inch thick with a maximum lead of 6 inches. A stock support roller for heavy stock is quickly removable when not needed. Double feed stops outside the guide rods are said to prevent any interference with the stock. The check roller system of positive stock control incorporates an improved, fully

enclosed clutch. A check roller release makes possible fast stock handling without changing the preset roller pressure. The gripper blade, point of greatest wear, has a carbide tip. The blade is adjustable vertically for hair-line setting and locks positively, allowing the gripper to be engaged without loss of adjustment.



Zagar 2" holding fixture



Zagar 1" indexing fixture

Zagar 5-C pull type collet



Hold on, there!



there's nothing better than a good watchdog

Depend upon  
**Zagar FIXTURES, too!**

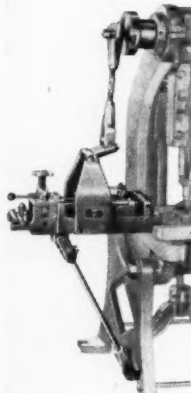
When all is said, this is the first, middle and last consideration — that fixtures, holding and indexing, must HOLD. On that score, Zagars have qualified famously for years — in simple and intricate machining operations. Accurate construction gives accurate performance. Zagar also has a complete line of air-operated holding fixtures and collet lathe chucks. Prompt deliveries NOW!

Write for Engineering Manual S-9

ZAGAR TOOL, INC., 24000 Lakeland Blvd., Cleveland 23, Ohio

**Zagar**

TOOLS FOR INDUSTRY  
and SPECIAL MACHINERY



Cooper Weymouth  
No. 4060 Slide Feed

enclosed clutch. A check roller release makes possible fast stock handling without changing the preset roller pressure. The gripper blade, point of greatest wear, has a carbide tip. The blade is adjustable vertically for hair-line setting and locks positively, allowing the gripper to be engaged without loss of adjustment.

## Improved Centerless Grinder Handles Stock Diameters from 0 to 1 and One Half Inches

Diversified Metal Products Co., 5125 Alcoa Ave., Los Angeles 58, Calif., has announced that its Diversimatic No. 1 Centerless Grinding Machine is now superseded by a new model of greater capacity and improved design. Designated as the No. 1-R, the new model has a capacity for stock diameters from 0 to 1½ inches.

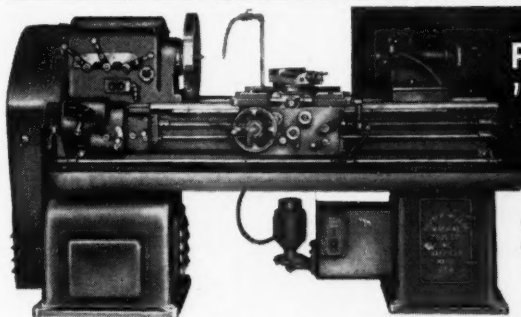
A complete line of accessories is now available for any type of centerless grinding operation, including automatic air-operated stock ejectors; outboard roller support attachments; toggle cam devices to provide greater width of opening between wheels; and automatic cycling attachment for infeed grinding. When the latter attachment is used in conjunction with a hopper feed arrangement, the Diversimatic becomes an entirely automatic machine.

The machine features a massive grinding wheel spindle supported by super-precision roller and ball bearings which combine to provide a cool-running spindle. The relatively small floor space required by the grinder makes it especially useful where space is of a limiting nature.



Diversimatic No. 1-R Centerless Grinder

The machine, which is guaranteed to maintain a tolerance of 0.0002 inch or better, can be used equally well in the grinding of steel, non-ferrous metals, glass, brass, porcelain, and plastic.



## PORTER McLEOD

16" Geared Head Quick Change  
Screw Cutting Engine Lathes  
6'-8'-10' Lengths

ONE OF THE FINEST ENGINE LATHES  
MADE IN THE UNITED STATES TODAY  
... Prompt Delivery with Priority!

Rigid and vibration-free, the Porter McLeod lathe is the product of a 60 year old company. More than 2500 are in service! All headstock gears are made of specially hardened chrome nickel steel. The spindle, also of chrome nickel steel, is forged and bored from solid stock, mounted front and rear on Timken roller bearings.

Many desirable features are incorporated in this precision lathe which is distributed exclusively by MOREY . . . Includes tailstock of cutaway pattern, taper gibbed compound rest. Lead screw has a chasing dial allowing operator to catch any thread at the beginning of each successive cut, while the feed rod is equipped with an adjustable automatic stop.

Write us for detailed catalog! Sales territories open.

### PARTIAL SPECIFICATIONS

Distance between centers (6"): 36"; (8"): 60"; (10"): 84". Hole through spindle: 1½". 12 spindle speeds, 23.6 to 1000 RPM. Anti-friction bearing headstock. 5 HP motor.

**MOREY**  
...for more value!

**MOREY MACHINERY CO., INC.**  
Manufacturers • Merchants • Distributors  
410 BROOME ST. • NEW YORK 13, N. Y.  
TELEPHONE: CANAL 9-7000 • CABLE: WOODBURN, N. Y.

## Chrome Carbide Sample Kit for Test Applications

A simple test kit containing a variety of shapes and sizes of the new Grade 608 cemented chrome carbide is now available from Carboloy Department of General Electric Co., 11143 E. 8 Mile Rd., Detroit 32, Mich. The kit is designed to enable production designers, development engineers, process engineers, and metallurgists to make a wide variety of metallurgical, physical, and chemical tests to check the corrosion, abrasion, and erosion resistance of the new carbide in specific applications.

Grade 608 chromium carbide is described as a strong and stable non-magnetic metal that contains 83 per cent chromium carbide, 2 per cent tungsten carbide, and 15 per cent nickel and has about the same density as S.A.E. steel and approximately the same thermal coefficient of expansion as steel. Typical applications indicated for the carbide include shear blades for molten glass; core pins for baking ceramic parts; fishing rod guides; centrifuge nozzles in separating equipment; bearings where corrosives are present; textile guides; nozzles and valves for processing soaps, fats, oils, foods, chemicals, petroleum products, pharmaceuticals, and fruit

juices; valve and core pins in die casting processes; punches for movie film; and a wide

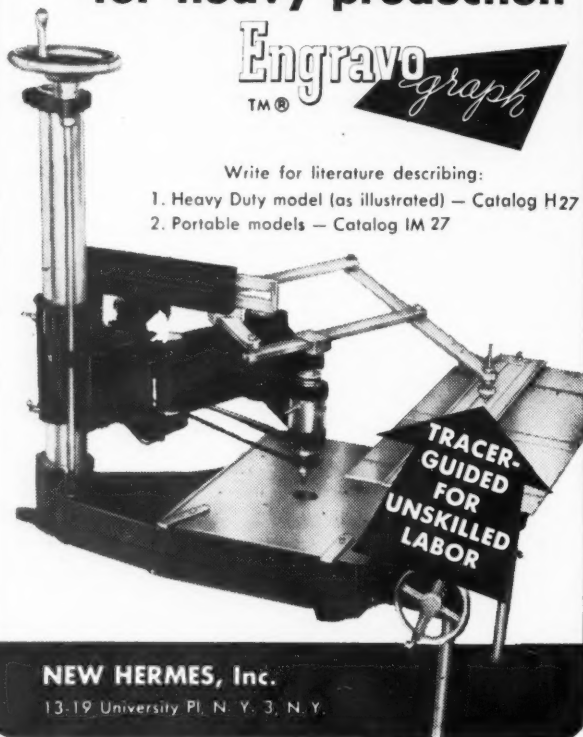
## ENGRAVING • PROFILING

### for heavy production

**Engravo**  
graph  
TM®

Write for literature describing:

1. Heavy Duty model (as illustrated) — Catalog H27
2. Portable models — Catalog IM 27



**NEW HERMES, Inc.**

13-19 University Pl. N. Y. 3, N. Y.



Sample test kit containing a variety of shapes and sizes of Carboloy Grade 608 Chrome Carbide

variety of other applications.

The kit contains three  $\frac{1}{4}$ -inch x 2-inch long square bars of carbide, two  $\frac{1}{4}$ -inch x 1-inch long square bars, three  $\frac{1}{2}$ -inch o.d. x  $\frac{1}{8}$ -inch long bushings with  $\frac{1}{8}$ -inch i.d., and one  $\frac{1}{8}$ -inch diameter x 1-inch long rod. The individual pieces of Grade 608 chrome carbide are assembled in an attractively designed transparent plastic case.

## Profile Projector Features Large Field of View

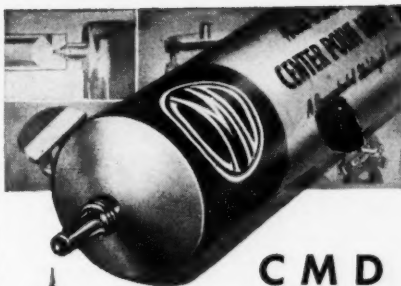
Designated as the Type PP-2, a profile projector designed for checking a wide variety of parts, cutters, hobs, dies, and so on, is now being marketed by Nife, Inc., Copiague (Long Island), N. Y. The projector features a large field of view and a 17 x 22-inch screen. According to the manufacturer, the high quality of the optics allows an object to be measured accurately by unskilled personnel at any



Nife Type PP-2 Profile Projector

point of the screen. The projector can be furnished with various objectives providing 10X, 20X, 50X, and 100X magnification. The 50X and 100X objectives, which are used for measuring high objects, are supplied with a special precision condenser tube. The 20X objective is furnished with a protecting tube which is placed on the lamp housing. The 10X objective is fitted with a wide field condenser.

Any of the objectives can be provided with a surface illumination attachment. A surface illuminator lamp unit on the left side of the instrument provides sufficient intensity to project surfaces, blind holes, and other objects which cannot be studied by means of their profile.



**CMD**  
**LUBRICANTS**

**PAY OFF** in higher production

... Because they have better anti-scoring qualities to work under extreme pressures.

Use CMD on your lathe centers, die set leader pins, steady rests, machine ways, cams, broaches, thrust bearings, taps and dies, to name a few. In fact, CMD lubricants work every day under pressures of 40,000 to 50,000 pounds per square inch in thousands of plants from coast to coast.



**CHICAGO MANUFACTURING  
& DISTRIBUTING COMPANY**

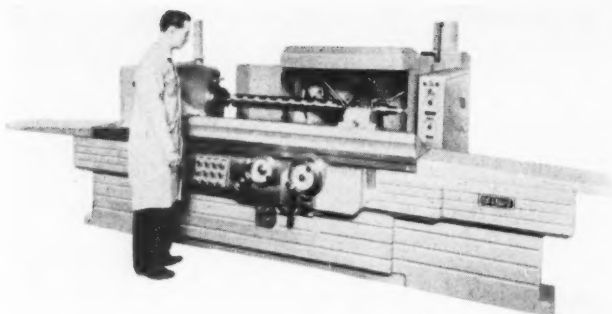
1910 West 46th Street Chicago 9, Illinois

Attach this coupon to  
your letterhead for  
**FREE SAMPLE KIT No. 79**

Your Name \_\_\_\_\_

Firm Name \_\_\_\_\_

Address \_\_\_\_\_



**Ex-Cell-O Style 36  
Precision Thread  
Grinder**

### **Thread Grinder Has Large Capacity**

The Ex-Cell-O Style Precision Thread Grinder announced by Ex-Cell-O Corp., Detroit 32, Mich., is described as a large capacity machine for grinding threads, worms, and other forms. It is designed to grind single or multiple threads, left or right hand, in any pitch from 1 to 128 threads per inch, and can be used with single or multiple-rib grinding wheels. An attachment for grinding accurate in-

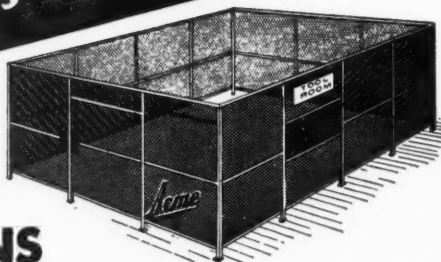
ternal threads is also available. Several types of diamond dressers may be used on the grinder if desired. The relation of work spindle speed to table feed can be quickly and easily changed to produce various leads. Right or left-

hand threads may be ground simply by positioning a lever. Setting of the lever to a neutral position permits the work spindle to be indexed for grinding multiple-start threads and worms. An automatic indexing attachment is also available.

Automatic functions of the machine include feed to finish size, wheel dressing, work size compensation for dressing, resumption of the grinding cycle after dressing, backlash compensation, control of the coolant flow, lubrication, and re-

**Leaders over 50 years**  
*Established 1899*

## **TOOL CRIBS and PARTITIONS**



**Standard Sections Woven Wire Mesh Panels and  
Doors to enclose Tool Crib, Stock rooms and other  
enclosures.**

**IMMEDIATE DELIVERY**

*Write for Catalog*

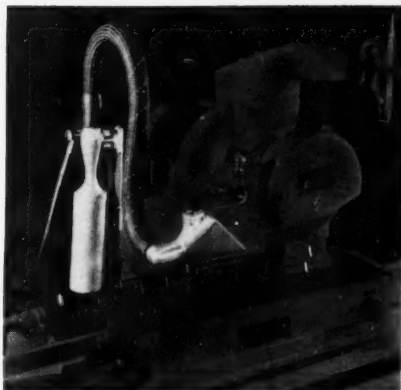
***Acme Wire & Iron Works***  
3527 E. Canfield ———— Detroit 7, Mich.

traction of the grinding wheel at the completion of the grinding cycle.

### Dust Collecting Unit Is Adaptable to Surface and Other Grinding Machines

A compact individual dust collecting unit with no moving parts, designed for use on surface grinders and other grinding machines where grinding dust must be removed, has been added to the line of Vulcanaire products built by The Vulcan Tool Co., 731 Lorain St., Dayton 10, Ohio. The unit, which may be easily installed and operated from present air supplies, is available in two sizes; namely, 200 Series with 24 cubic inch capacity for grinding wheels 2 inches in diameter or under, and 700 Series with 56 cubic inch capacity for grinding wheels 7 inches in diameter or under.

The Vulcanaire Dust Collecting Unit can be quickly cleaned and requires no refills. Positive location of the dust cup is assured by mounting on the grinding wheel guard or close to the grinding wheel on other applications. This arrangement permits constant contact of the cup with



Vulcanaire Dust Collecting Unit installed on a surface grinder

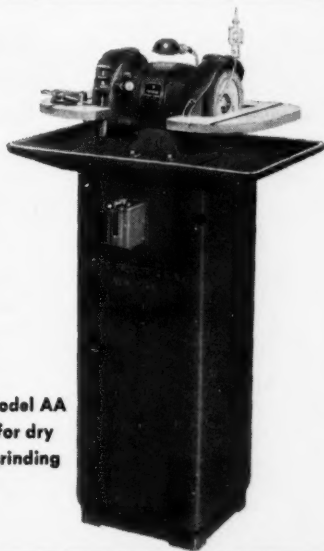
the dust as the wheel is moved up or down. The collector element is mounted on the side of the machine. A simple needle valve is used to operate the unit, which can be shut off when the machine is not in use.

## POWER TO SPARE the NEW

### Prosser Bench Grinder

This New model AA Bench Grinder is built for precision and durability. The additional power of the  $\frac{1}{2}$  h.p. motor, and an extra large shaft insure you smooth, vibration-free performance.

The new AA model also has the famous Prosser table indexing feature for easy, instant setting of exact grinding angle, that locks rigidly in position. Economical too, because the compensation for wheel wear permits virtually 100% use of wheel. Equally efficient with diamond, silicon carbide, or aluminum oxide wheels. For rough or finishing work on carbide, high speed steel, stellite or other modern tools. Wet or Dry. For detailed information write:



Model AA  
for dry  
grinding

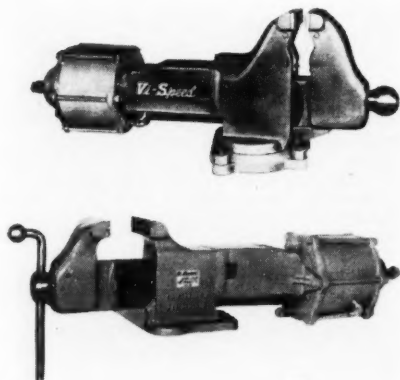
**THOMAS PROSSER & SON** 120 WALL STREET,  
NEW YORK, N. Y.

## Air-Operated Bench Vises Are Said to Feature Power Ratio of 100:1

Van Products Co., 3734-51 W. 12th St., Erie, Pa., has announced two high-powered air-operated bench vises, designated as the "Vi-Speed" Models 610-DP and 1000-DP, featuring a power ratio of 100:1. This unusual power is furnished by a compact cylinder with an 8-inch bore and two pistons of 50 square inches each, separated by a removable cylinder head. The packing boxes are equipped with automatic "U" packers and the pistons with heavy duty cup seals made of high grade long-lasting synthetic rubber. The cylinders are single-acting, incorporating a fully enclosed spring return. The piston stroke, and therefore jaw stroke, is 0 to 1 3/4 inches maximum. The stroke is controlled by means of a safety stop screw.

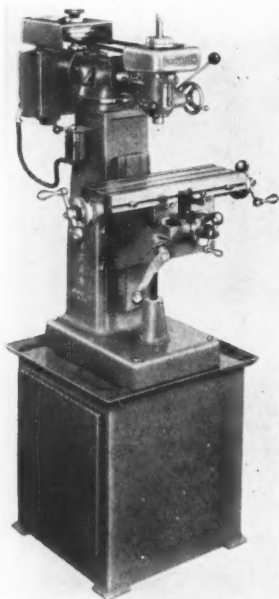
The Models 610-DP and 1000-DP both have 6-inch wide jaws with maximum openings of 10 and 11 inches respectively. The Model 610-DP is available with a stationary or swivel base and the Model 1000-DP with a swivel base only. Smooth jaw faces are available on both models, and the Model 1000-DP can be furnished

with heavy pipe jaws for accommodating all sizes of pipe through 6 inches in di-



(Above) "Vi-Speed" Model 1000-DP Combination Machinist and Pipe Vise. (Below) "Vi-Speed" Model 610-DP Bench Vise

ameter. Balanced controls are furnished with each vise.



## THE JOHANSSON VERTICAL MILL OFFERS THE QUALITY You Want

Compact, rugged, precision-built, the Johansson Vertical Mill affords the quality in design and construction that you demand of today's machine tools.

Standard on every Johansson Mill are pre-loaded ball bearing spindle... handle and wheel feed for drilling and boring... micrometer depth stop... positive quill lock... ball bearing mounted lead screws, with precision ground threads... special, large dials... hand scraped ways throughout... and many other "extras."

Just check the specifications... you'll agree the Johansson is a mill of outstanding quality, and is priced surprisingly low!

Write for bulletin today

### Condensed Specifications:

Table, 6"x18", 6"x24"  
Long. Travel... 12", 16"  
Cross Travel... 5"  
Vert. Travel... 12"  
Quill Travel... 2-1/16"  
Spindle Speeds (6)  
180 to 3250 RPM  
(with 1725 RPM motor)

**JOHANSSON**  
**MACHINE TOOLS**

built by

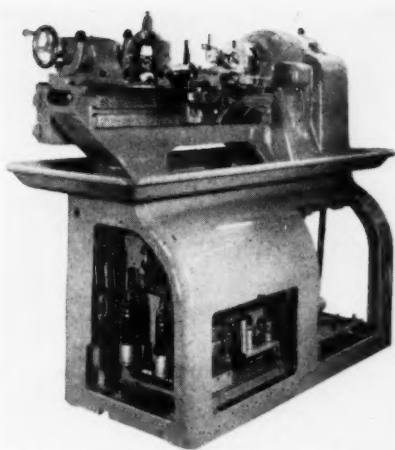
**THE I. O. JOHANSSON CO.**  
7732 Austin Ave., Skokie, Ill.

## Infinitely Variable Electronic Drive for Tool and Gagemaker's Lathe

The Hendey Machine Co., Torrington, Conn., has announced an infinitely variable electronic drive for the Hendey 9 x 24-inch Tool and Gagemaker's lathe. This unit is designed to fit into the base of the lathe as an optional control for the 3 h.p., d.c., adjustable speed motor.

The electronic drive contains two 18-ampere heavy-duty electronic rectifier tubes in the power circuit and one smaller rectifier tube in the control circuit. It provides a stepless speed from 25 to 3,000 r.p.m. by potentiometer control of both field and armature of the motor. Extremely close speed control is said to be obtained even under changing load, and full torque is claimed to be achieved at low speeds over the complete armature control range by means of I.R. compensation. A thermal overload relay protects the motor from sustained overloads.

According to the manufacturer, the electronic unit requires approximately 60 seconds for heating, and power cannot be applied before the tubes are heated. A pilot on the control panel lights when the tubes are energized, and the tubes are said to remain energized for immediate use during all ordinary standby peri-

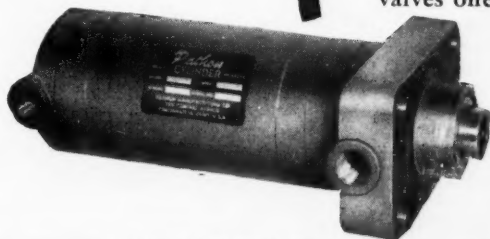


Rear view of Hendey 9x24-Inch Tool and Gagemaker's Lathe with electronic drive

ods. Dynamic braking provides for a full stop from maximum speed in approximately  $1\frac{1}{2}$  seconds. The drive unit requires a 220 or 440-volt single-phase 60-cycle power supply.

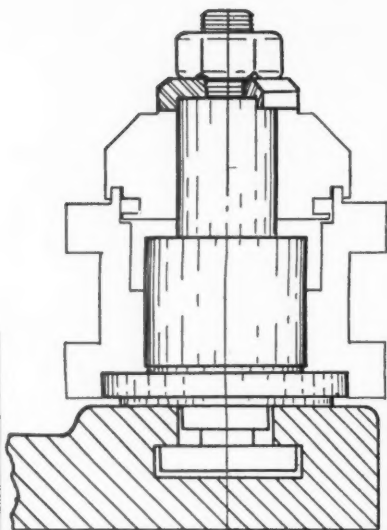
# Pathon

**2000 PSI  
HYDRAULIC  
CYLINDERS...  
VALVES**



Compact, easy to install, Pathon 2000 PSI Hydraulic cylinders and valves offer you efficient, trouble-free operation. Write for our catalog today.

**PATHON MANUFACTURING CO.** 3827 PACIFIC AVE.  
CINCINNATI, OHIO



## HEAVY-DUTY, SELF-INDEXING TOOL POST TURRETS

**Note: Exclusive Super-Solid  
Center Post Construction**

Tool up with Lynn turrets. They increase variety and output. Save time. Built for all sizes and makes of engine and turret lathes and screw machines. **Note:** The extra large bearing on the post assures absolute rigidity, increases precision and makes for longer life. They are accurate, without installing more lathes.

## "F" SERIES TURRETS BT-1 — BT-2

For Atlas and Logan lathes, either pilot wheel or lever type. **Special Features:** Automatic indexing—double gibs for wear adjustment—heavy duty design square turret ways—lifetime precision tool indexing—turret head lock. Greatest possible precision assured.

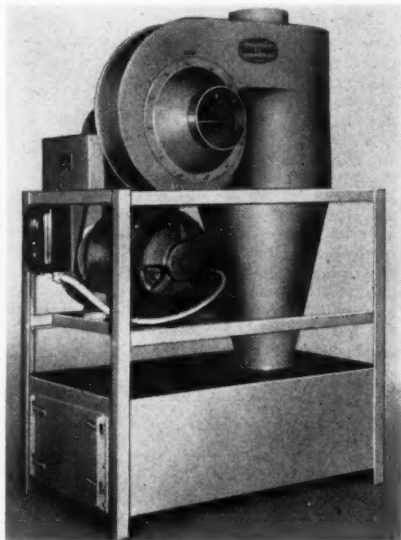
**Write or Phone Atlantic 7267**

**LYNN MANUFACTURING CO.**

1121 So. 7th St., Minneapolis, Minn.

## Dust Collector Has Outside Exhaust and Drive for Low Frequency Power

Aget-Detroit Co., 207 Main St., Ann Arbor, Mich., has introduced the "Dustkop" Model 30ND50 Dust Collector illustrated herewith, which provides for outside exhaust of cleaned air, together with an over drive when used on electric power having frequencies of less than 60 cycles. The unit, which has a rated capacity of 3,630 c.f.m. at 6-inch static suction on an



"Dustkop" Model 30ND50 Dust Collector

8-inch diameter pipe, employs a standard size pretested cyclone separator that removes the dust and dirt from the air and permits the discharge of the cleaned air, together with any toxic or objectionable fumes, to the out-of-doors. A dust storage capacity of 12 cubic feet is standard. Access to the dust compartment is afforded by doors at either end. Where the unit is to be used for jobs involving very large amounts of collected dust, it can be supplied with either an extension or with a hopper bottom.

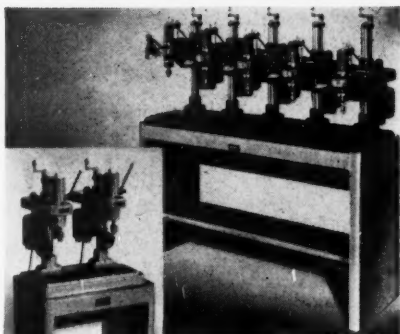
Standard equipment of the Model 30ND50 includes a 5 h.p. motor for operation on either 220 or 440-volt 3-phase 60-cycle power, as well as a manual starting switch which has thermal overload pro-

tection. The dust collector, which requires no assembly at destination, is recommended for use with grinding, buffing or polishing wheels, surface grinders, wood-working machines, and other equipment.

### Small-Hole Precision Drilling Machines Offered in Multiple-Spindle Designs

The Hamilton Tool Co., 828 S. 9th St., Hamilton, Ohio, has announced that its super-sensitive small-hole precision drilling machines are now available in single-base multiple-spindle designs. The machines have capacities for drilling holes from 0.004 to  $\frac{5}{16}$  inch in diameter, and clearances up to 8 inches from the center of the chuck to the column and up to 14 inches from the base to the chuck. Adjustable stops are provided on all machines for the precision control of hole depth, and one model features spindle speeds, variable between 840 and 9,000 r.p.m., controlled by a graduated hand-wheel speed dial.

According to the manufacturer, the machines are being offered in single-base multiple-spindle designs in response to



Hamilton Single-Base Multiple-Spindle Small-Hole Precision Drilling Machines

the growing demand for high production in precision drilling. The accurate machining of the continuous base pads is said to make the use of box fixtures feasible, thus increasing production materially with no loss in precision. Stands are also available in appropriate lengths, as shown.

Designed for

## TOOL ROOM EFFICIENCY

### HUPPERT MODEL 11 FURNACE

Years of low-cost operation on heaviest schedules in tool and die shops, and laboratories have dictated these features for your economy. Huppert Automatic Temperature Control for accuracy to 2000° F. — Huppert Multi-Insulation, Heavy-duty Kanthal elements, and fully enclosed contacts. Counterweighted, tight-sealing door. I.D. 8" x 6" x 12". 220 V AC, 4½ KW max. load.

**Model 11ACB—\$440.00 Complete**

**Model 11 (Without Temp. Control)—\$240.00**

#### OTHER MODELS

	I. D.	Max. Temp.	Fahr.	KW	Price Without Temp. Control
Model 869BM	8"x6"x9"	2000°		4	\$280.00
Model 12	8"x8"x12"	2000°		6	320.00
Model 12A	8"x8"x18"	2000°		9	400.00
					Price With Temp. Control
Model 869ACB	(Same specifications as shown above)				\$480.00
Model 12ACB	(Same specifications as Model 12)				520.00
Model 12A-ACB	(Same specifications as Model 12A)				600.00

All models can be supplied for 2300° F. operation for small additional cost.

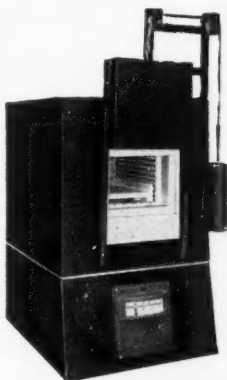
WRITE FOR DETAILS

### K. H. HUPPERT COMPANY

6841 Cottage Grove Avenue

Chicago 37, Illinois

Manufacturers of Electrical Furnaces and Ovens



## Bench Type Heat Treating Furnace Has 10 x 6 x 18-inch Chamber

Cooley Electric Mfg. Co., Dept F-2, 34 S. Shelby St., Indianapolis, Ind., has announced a bench type heat treating furnace, designated as the VK-7, which has chamber dimensions of 10 x 6 x 18 inches. Made for heat treating to 2,000 deg. F., the furnace is equipped with heating elements of 6.5 kw. capacity (at 220 volts, single phase) on all four sides of the chamber and in the door to provide for even heat distribution and close temperature uniformity. The elements are of



Cooley VK-7 Bench Type Heat Treating Furnace

the embedded design to protect the element wire against atmospheric attacks and mechanical breakage. Renewal of elements can be made without dismantling the furnace.

The Cooley VK-7 Furnace is furnished complete with a fully wired and integrally mounted control panel containing a control pyrometer, fused line switch, and instrument fuses.

## Unit Provides for High Precision Abrasive Cutting of Various Materials

Cutting by means of a high-velocity stream of gas-propelled abrasive particles, the S.S.White Industrial "Airbrasive" Unit announced by The S.S.White Industrial Division, Dept. 5, 10 E. 40th

## SMALL PRECISION PINS

### Made to Blueprint

DOWEL • STRAIGHT  
COUNTERSUNK • TAPER

±.0001" Accuracy  
.030" to .125" Diam.  
Up to 2" Length

Precision Centerless Grinding Since 1931

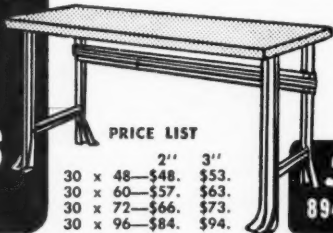
INQUIRY INVITED ON YOUR  
VOLUME REQUIREMENTS

## COMMERCIAL CENTERLESS GRINDING CO.

6605 CEDAR AVE. Phone EN 1-3412 CLEVELAND 3, O.

Top Values in fine

## Work Benches



### PRICE LIST

	2"	3"
30 x 48—\$48.	\$53.	
30 x 60—\$57.	\$63.	
30 x 72—\$66.	\$73.	
30 x 96—\$84.	\$94.	

Laminated hard maple tops on sturdy pressed steel base—bolted construction. Smooth enough

for the most delicate work, strong enough for the heaviest.

Tops available 2" or 3" thick

Special sizes, prices on request.

Send for folder

**Shore WOODWORK CO.**

894 N. 40th St., Phila. 4, Pa.

St., New York 16, N. Y., is said to provide a fast, accurate method of performing a number of high precision operations, including controlled removal of metallized films from glass and ceramics, drilling thin sections of hard-to-work materials, cutting extremely hard or brittle materials, etching, light deburring and polishing. In operation, the unit directs a gas-propelled abrasive stream against the work surface through a sintered tungsten carbide nozzle. As it leaves the nozzle, the stream travels at approximately 1,100 feet per second and is only 0.018 inch in diameter.

The cutting action is said to be accomplished without increase in temperature and without pressure and vibration. Moreover, the unit is claimed to have practically no effect on resilient or soft materials such as rubber, cloth, and certain types of plastics. Likewise, it is said not to damage skin tissue should the operator accidentally put his hand in front of the abrasive stream. Normally, a specially processed aluminum oxide powder is used as the abrasive. For certain applications which require a lighter abrasive, a classified Dolomite — a mixture of calcium and magnesium carbonates — can be supplied. Any dry inert gas can be used



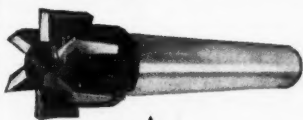
S.S. White Industrial "Airbrasive" Unit in use

as the propellant, the manufacturer states.

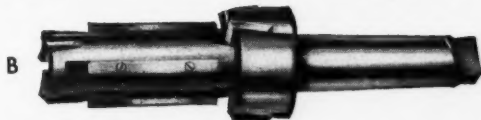
Designed to operate on 110-volt 60-cycle a.c., the S.S. White Airbrasive Unit measures  $8\frac{1}{2}$  x 15 x  $12\frac{1}{2}$  inches high and has a net weight of 42 lb. In addition to the necessary detachable connections, spare parts, and test equipment, the unit is supplied with two right-angle nozzles and one straight nozzle. The right-angle nozzles are used for manual operation. The straight nozzle is used for production work where it would be held in a fixed or automatically operated jig.

## APEX INSERTED-BLADE METAL-CUTTING TOOLS

### Milling Cutters Stocked in Over 20 Types



A



B

(A) END MILL. (B) COMBINATION BORING AND FACING MILL. Both are made with tapered, serrated blades adjustable to hold diameters. (C) ALTERNATE ANGLE CUTTER. Slots all widths  $\frac{1}{2}$ " and over, and all diameters 4" and larger. Blades of H. S. Steel, Super Cobalt, Stellite or Carbide Tipped. Write for catalog showing complete line of multiple and single-point tool bits, serrated or round shank.



C

**APEX TOOL & CUTTER CO., Inc., Shelton 15, Conn.**

## Bench Grinder Provides for Easy Grinding of Oddly-Shaped Parts

Stanley Electric Tools, New Britain, Conn., has announced a  $\frac{1}{4}$  h.p. ball bearing bench grinder, designated as the No.



Stanley No. 246 Bench Grinder

246, which is designed to provide for the easy grinding of large, oddly-shaped parts and castings. The flat surface of the grinder housing permits the operator to maneuver castings or parts to be ground

so that both sides of each grinding wheel may be used. The grinder is equipped with adjustable tool rests and safety wheel guards which are wide enough to permit the use of wire wheel brushes. The guards are drilled for the mounting of Stanley eyeshields. The toggle-type operating switch is enclosed in a molded case located on the base of the grinder.

The No. 246 is furnished complete with a three-wire rubber-covered cord with ground connections; firm-gripping rubber feet; 6 x  $\frac{5}{8}$ -inch grinding wheels (one coarse and one fine); wheel guards; and tool rests. The  $\frac{1}{4}$  h.p. motor is a full ball bearing constant-speed induction type which is designed to operate at 2,850 r.p.m. full load and 3,450 r.p.m. no load on 50-60-cycle single-phase alternating current of 110-115, 125, 150, or 220-230 volts. The net weight of the grinder is 45 pounds.

## 8-Inch Drum Sander Operates Efficiently with Portable Grinding Equipment

A lightweight 8-inch diameter x 2-inch wide sanding unit has been added to the line of 6 $\frac{1}{4}$ , 10, 12, and 16-inch diameter

## How to speed production with MAGNIFIERS



Cut waste, get faster, surer inspection by fitting the magnifier to the job. Get top performance magnifiers made by Bausch & Lomb, recognized world leader in precision optical goods. Operators see more clearly; accurate decisions are made easier, costs are reduced.



WRITE for new handbook and catalog, "Industrial Magnifiers—How to Choose and Use Them," Bausch & Lomb Optical Company, 50509 Bausch St., Rochester 2, New York.



### NEW 5X HASTINGS TRIPLET

Maximum correction combined with moderate power to provide exceptionally wide field, long working distance and superb definition. Available with new Hand Illuminator.



BAUSCH & LOMB

*Magnifiers*

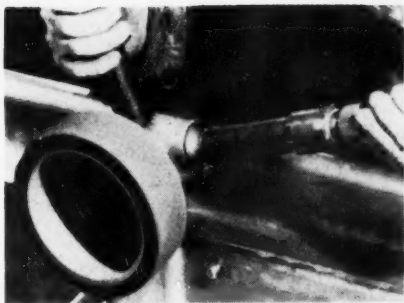


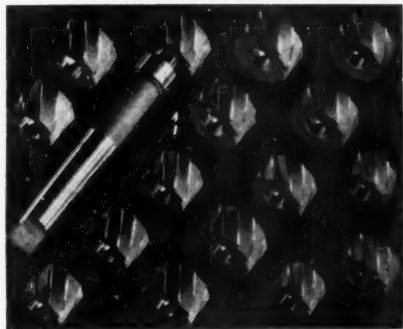
Illustration showing Cone-Loc Drum Sander being used with flexible shaft equipment

Cone-Loc Drum Sanders distributed by The Carborundum Co., Niagara Falls, N. Y. Described as a split drum type sanding unit that permits the use of strips of coated abrasives, the 8-inch diameter Cone-Loc, operating at speeds around 3,500 r.p.m., provides a cutting speed of over 7,000 surface feet per minute with coated abrasives. The sander weighs 3½ lb. and can be used satisfactorily with portable grinding equipment.

### Reamer Utilizes Interchangeable Heads

A reamer designed so that its shank can be quickly and easily interchanged with a wide range of heads has been announced by The Tomkins-Johnson Co., Jackson, Mich. The reamer is available in a spiral or straight-flute type. The head has a tapered hole which is said to ensure

Illustration showing T-J Interchangeable-Head Reamer together with several different sizes of interchangeable heads



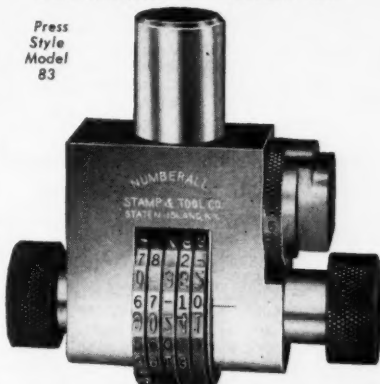
September, 1952

## NUMBERALL

CUTS THE COST OF STAMPING NUMBERS

### SELECTIVE NUMBERING HEADS All wheels • QUICK SET

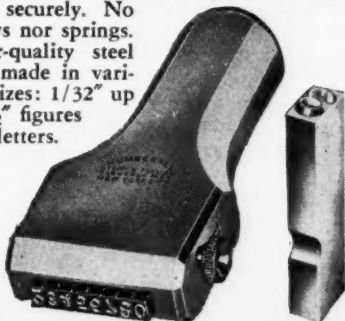
Press  
Style  
Model  
83



Model 83 Heads for all stamping operations requiring quick selective numbering. Wheels engraved with direct sight figures at front of machine. Set to the required character by turning the knobs. By pushing the knobs right or left anyone of the wheels may be engaged. Indexed wheel selector knob serves as a positive stop for every wheel. 1/16" to 1/4" size figures. Letter wheels, with up to 11 letters and a blank on each wheel can also be supplied. Heads are more efficient and durable than old style lever machines. Furnished in sizes from 1 to 15 wheels. Bulletin MS83.

### IMPROVED TYPE HOLDERS

Hand or Press style. Type can be easily, quickly loaded and unloaded. Simplest construction . . . Just a sturdy pin holds the type securely. No screws nor springs. Super-quality steel type made in various sizes: 1/32" up to 1/2" figures and letters.



Write for Bulletin MS23H

Steel Type

**NUMBERALL STAMP & TOOL CO.**  
HUGUENOT PARK STATEN ISLAND 12, N. Y.

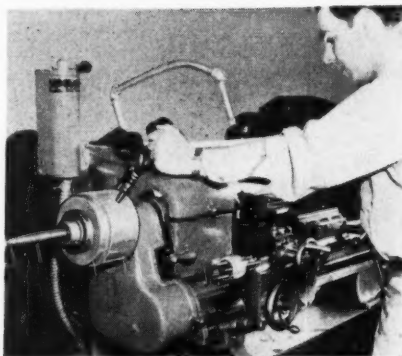
MODERN MACHINE SHOP 401

concentricity and a snug fit on the smoothly ground tapered shank and yet permits the head to be quickly removed. The quick-change feature enables the machinist to change heads when reaming different metals and thus obtain maximum performance on the metal cut.

According to the manufacturer, the T-J Interchangeable-Head Reamer is designed so that it operates free from binding or sticking due to the cutting portion of the reamer wearing undersize and creating of a negative relief.

### Pneumatic Collet-Closer Designed for Production and Toolroom Operation

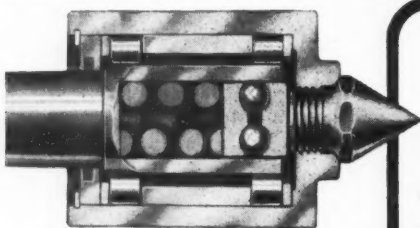
Known as the "Wil-Numat," a pneumatic collet-closer designed for both production and toolroom operation of turret lathes, engine lathes, automatic screw machines, and other collet-equipped machines of 1/2 or 1-inch collet capacity has been announced by Williams Metal Products, 3713 S. Robertson Blvd., Culver City, Calif. According to the manufacturer, the unit can be easily installed without any alteration to the machine. The complete unit includes a collet-closer, air regulator, and valve with necessary air pressure



"Wil-Numat" Pneumatic Collet-Closer

lines. A flick of the valve is said to instantly lock the work in position without vibration, slamming, or jarring of the stock.

The unit features non-stop operation which permits the feeding and releasing of bar stock through the spindle without stopping the machine. Pressure on stock can be rapidly adjusted to job variations by the regulator supplied with the unit.



TYPE FHH

### "BULFLEX" SPRING LOADED

Extremely Heavy-Duty  
IMMEDIATE DELIVERY

## Bultool LIVE CENTERS

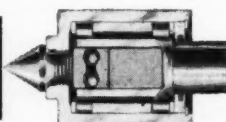
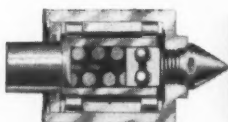
- ULTRA-ACCURATE
- TROUBLE FREE
- NON-CHATTERING

GUARANTEED . . .

TOTAL INDICATOR RUN-OUT . . . .0003"

Dealer inquiries invited.

Write for 4 page bulletin.



243 W. CONGRESS ST.

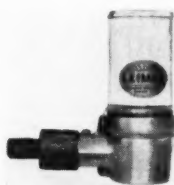
• DETROIT 26, MICHIGAN

• WO 1-3258

## Automatic Oiler Reduces Oil Vapor in Air Pump

Specially developed to automatically feed measured amounts of oil to Leiman air pumps, the E-113 Oiler announced by Leiman Bros., Inc., 168 Christie St., Newark 5, N. J., provides for adequate lubrication of wings and vanes; yet delivered air is said to be virtually oil-free for operations requiring extremely low oil vapor content. The oiler is designed to feed any oil from S.A.E. 10 to S.A.E. 70. The rate of feed can be quickly adjusted from 1 drop in 4 minutes to 4 drops in 1 minute.

The Leiman E-113 Oiler, which can be supplied on new Leiman air pumps, as well as to present users of



Leiman E-113 Pump Oiler

Leiman air pumps in service, includes a transparent visual reservoir that is hinged for easy refilling and holds 3 oz. of oil. The oiler, which has no moving parts and feeds only when the pump is operating, is actuated by means of a draft of air passing through the unit. Thus, the oiler can be used on a vacuum pump, or on the inlet of a pressure pump. A heat insulator is said to prevent heat of the pump from warming and thinning the oil contained in the glass reservoir.

## "Nibbler" Attachment Cuts All Types of Thin Metals

Known as the "Nibbler," a handy attachment for all Mall electric power drills, announced by Mall Tool Co., 7814 S. Chicago Ave., Chicago 19, Ill., is said to provide an ideal tool for artistic metal cutting, scalloping, and similar intricate jobs. The attachment is designed for cutting all types of thin metals, such as sheet steel, brass, or copper, up to 19 gage. The width of cut is  $\frac{1}{4}$  inch.

A high-speed punch type cutter attachment, the Nibbler is said to operate with



★  
**IMMEDIATE DELIVERY!**

★  
**NO PRIORITIES REQUIRED!**

★  
**No. TR-1N 4 ft.  
No. TR-2N 5 ft.**

Rigidly built and carefully constructed for top performance and production economy, these radial drilling machines feature hardened and ground gears of high tensile alloy steel, accurately balanced and precision cut.

### PARTIAL SPECIFICATIONS

	TR-1N	TR-2N
Drilling cap. in cast iron .....	2 $\frac{3}{4}$ "	2 $\frac{3}{4}$ "
Drilling cap. in steel .....	2"	2"
Max. drilling radius .....	45 $\frac{1}{2}$ "	65 $\frac{1}{2}$ "
Vert. travel of spindle .....	13 $\frac{3}{4}$ "	13 $\frac{3}{4}$ "
Spindle speeds (16) .....	40-1500 rpm	40-1500 rpm

• Write us for complete information!

**KELVIN SYSTEMS CORPORATION**  
135 FRONT ST., NEW YORK 5, N. Y.



IMPORTERS OF MACHINE TOOLS  
RADIAL DRILLS • MILLERS  
TURRET LATHES • GRINDERS  
SHAPERS • COPYING LATHES

# Economy

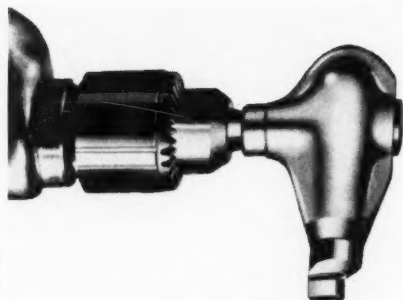
## TOOLS KEEP YOU AT TOP PRODUCTION WITH MINIMUM COST



Your job can be no better than the tools applied in the making. You'll find that ECONOMY'S close-tolerance drill-jig bushings and gages meet your exact specifications and high production standards. Write for bulletin and price list on all A.S.A. standard types and sizes, as well as new gages and gages salvaged by hard chromium plating.

**Economy**  
**TOOL & MACHINE CO.**

1827 S. 68TH ST., MILWAUKEE 14, WIS.



Mail "Nibbler" Attachment

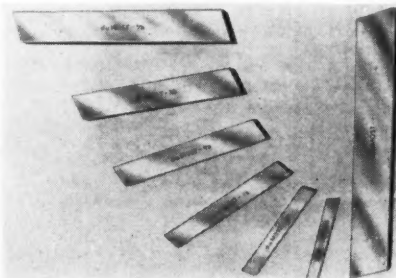
any  $\frac{1}{4}$ -inch capacity standard or heavy duty electric drill at speeds of from 800 to 3,500 revolutions per minute.

### High Speed Steel Tool Bit Has Unusual Resistance to Abrasive Action

The du Mont Corp., Greenfield, Mass., has introduced a tool bit made of special super high speed steel with precisely blended and balanced carbon and vanadium which is said to produce extra fine grain structure. Designated as the du MOST, the bit is heat treated to provide a hardness of 66 to 68 Rockwell "C" and is ground to close tolerances without decarburization, it is claimed.

Said to have unusual toughness and resistance to abrasive action, the bit is offered in squares (with both ends beveled 20 degrees) in nine sizes from  $\frac{1}{4}$  inch square x  $2\frac{1}{2}$  inches long to 1 inch square x  $7\frac{1}{4}$  inches long.

du MOST Tool Bits



## Pump and Motor Assembly Provides Economical Coolant System

A coolant pump and motor assembly which, when immersed in a pail or other



Factory Tools Coolant Pump and Motor  
Assembly

container of coolant, becomes a complete coolant system has been introduced by Factory Tools, Inc., 4706 W. Arlington St., Chicago 44, Ill. The built-in high-volume vane-type pump, driven by a fully sealed 1/30 h.p. motor, is designed to deliver a steady stream of coolant or oil through a 4-foot long semi-rigid flexible metal hose which is equipped with a variable volume nozzle that permits adjustment of coolant flow from a trickle to full volume. The semi-rigid metal hose

provides for fast, easy positioning of the nozzle for delivery of the coolant stream at any desired point, and is designed to resist abrasion, scuffing, and the harmful effects of oils, acids, and various other solutions.

The supporting legs of the unit are threaded to permit height adjustment of the pump and motor for the container and the coolant level. The legs are angled out to provide a stable support for the assembly. The unit is supplied with a heavy 6-foot rubber-covered electric cord complete with built-in "on-off" switch.

## ARE YOU AFTER PRECISION?

THE *Sine* ANGLE  
WHEEL DRESSER  
*is your Answer!*

With the aid of standard gauge blocks or adjustable parallels, wheels may be quickly dressed to any angle from 0° to 90° with assurance that the angles will be accurate within plus or minus 10 seconds.

Ruggedly built to withstand everyday shop use, it is a precision tool with bearing surfaces hardened, ground and lapped.



PRICE \$97.50 without diamond

Finest quality mounted diamond  
1/2 Karat—\$8.50 • 1/4 Karat—\$14.00 • 1 Karat—\$20.00

**AMERICAN STANDARD COMPANY**

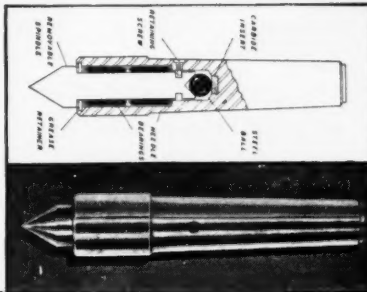
Dept. 5 PLANTSVILLE, CONNECTICUT

## GREAT NAMES trust WEE LIVE CENTERS

Exclusive SMALL HEAD design of WEE Live Centers combines live center advantages with size and accuracy of dead centers. 30 to 40% less overhang means deeper cuts, faster speeds, no chatter. You, too, can depend on them. Used by hundreds of leading concerns. No. 2 M.T., \$21.00. Request complete price list.

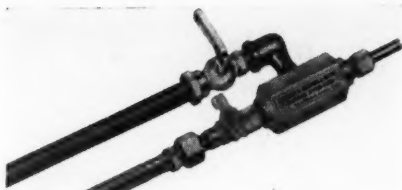
Write direct, if distributor cannot supply you.

**HERBERT CROSS & SON, Bala-Cynwyd, Pa.**



## System Is Effective for Cooling and Lubricating Cutting Tools

The Henry G. Thompson & Son Co., New Haven 5, Conn., has announced the Milford "Atom-Lube," atomized lubricating and coolant system which is said to provide for the effective cooling and lubricating of cutting tools, with resultant longer tool life, faster cutting speeds, and improved cutting quality. Effectively operated either by existing industrial air pressure lines or small air compressors, the system provides a powerful air jet that is said to atomize any cooling and lubricating liquid desired—from water to heavy machine oil.



Milford "Atom-Lube" Atomized Lubricating and Coolant System

Although the Atom-Lube is a non-circulating system that uses clean, fresh

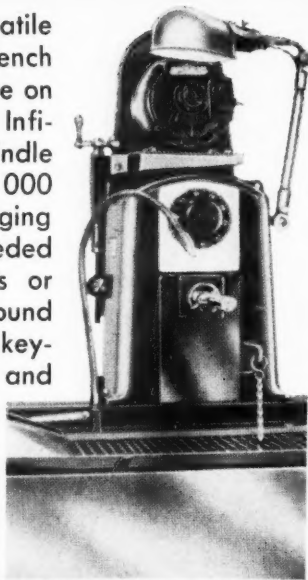
coolant at all times, its coolant consumption is claimed to be unusually low. Efficient action and convenient operation are effected by a flexible nozzle that permits the vapor spray to strike the edge of the cutting tool at the most effective angle. Simple, sturdy construction is said to keep installation and maintenance costs at a minimum. The Atom-Lube is supplied complete with mounting bracket, 12 and 6-inch matched nozzle tubes, 4 feet of 1/4-inch i.d. hose for coolant, and 1/4-inch SPS nipple for air connection.

MODEL "J"

# Superior

## BENCH TYPE HONING MACHINE

Here's the most versatile and economical Bench Type Honing Machine on the market today! Infinitely variable spindle speeds from 400 to 1000 R. P. M. with no changing of belts. No tools needed to change mandrels or stones. All stones ground to size. Will hone keyways, spline gears and most broken surfaces. Size 13" x 16 1/2" x 25" high. Shipping weight only 120 lbs.



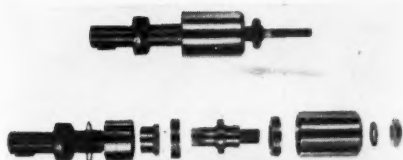
# Superior

## HONE CORP.

1611 ELRENO ST. • ELKHART, INDIANA

## Floating Tap Holder

Scully-Jones & Co., 1909 S. Rockwell St., Chicago 8, Ill., has announced a floating tap holder designed for use in multiple spindle machines. Designated as the "JT," the holder has a double gear spline drive coupling for the neutralizing or



Scully-Jones "JT" Floating Tap Holder

intermediate driving member. Clearance between mating splines allows free movement at all times. Two thrust bearings, placed close together and separated from the drive, minimize the effect of the force applied on the tool by the hole and permit taps to float freely into alignment.

Other features of the JT Floating Tap Holder include a small body diameter for operations on close centers; short projection, thus requiring minimum space between spindle and work; collet split on four sides, centering tap by the shank and reducing strain and tap damage; quick-lock nut which is designed to lock any place on the threaded adapter shank so as to facilitate adjustments; arrangement which permits balls to move or rotate freely around the collet, thus reducing "scrubbing" action; positive lubrication of all parts during operation, thereby minimizing wear of the floating elements; and outer shell with "O" ring, designed to provide positive seal to retain lubricant and keep out chips.

## Accessories for Setting-Up Work on Machine Tools

In addition to a complete line of strap clamps, J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y., has added T-slot bolts, nuts, flat washers, T-slot nuts, and set-up wedges to its line of accessories used for setting-up work on planers, shapers, milling machines, and other similar applications. All accessories are made from a high grade of steel to withstand severe machine shop use.

According to the manufacturer, Williams T-Slot Bolts are designed so that they will not turn in the machine table

# CLIP THE COUPON AND SAVE —

Many A Minute  
Many A  
Machining Job  
Many A Dollar

with a *Minute Man*®  
**KEYWAY BROACH KIT**

to cut your keyways from  $\frac{1}{16}$ " to 1" in any  
bore from  $\frac{1}{4}$ " to 3" in one minute per keyway  
for as little as one cent per keyway.

The du MONT CORPORATION, Greenfield, Mass.

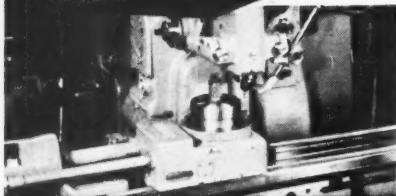
Please mail folder and price list "S" on  
*Minute Man Keyway Broaches and Kits* to

Name .....

Company .....

Address .....

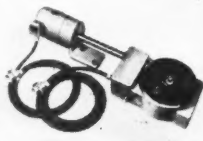
## How To Increase Production And Improve Accuracy



### With a **SUNDSTRAND** Automatic Index Base

In many cases, the addition of this Automatic Index Base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this service.

**Accurate  
Spacing,  
Powerful  
Clamping  
Insures  
Accuracy**



Sundstrand  
Automatic Index Base

This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

### Get Complete Data Free

This 8 page booklet contains production figures and specifications. Send for your copy today. Ask for bulletin 524.

**SUNDSTRAND**



**SUNDSTRAND MACHINE TOOL CO.**  
2539 Eleventh Street, Rockford, Ill., U.S.A.



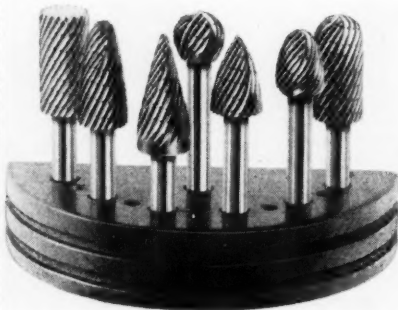
Williams Set-Up Accessories

or break out machine table slots. The bolts are available in  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{5}{8}$ ,  $\frac{3}{4}$ ,  $\frac{7}{8}$ , and 1-inch T-slot sizes in a wide range of lengths.

### Midget-Mill Set Includes Seven $\frac{1}{4}$ -Inch Shank Tools

Severance Tool Industries Inc., 724 Iowa St., Saginaw, Mich., is now offering the Severance Midget-Mill Set No. 77 illustrated herewith, which comprises seven  $\frac{1}{4}$ -inch shank high speed mills all with  $\frac{1}{2}$ -inch diameter cutting heads. Made of high speed steel, the tools are designed to cut fast and clean on a wide range of materials. An attractive wooden tool block for convenient storage and handling is supplied with each set of Midget Mills.

Severance Midget Mill Set No. 77



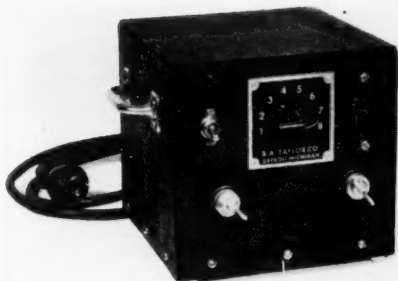
## Friction, Rubber, and Plastic Tapes

Ideal Industries, Inc., 1031 Park Ave., Sycamore, Ill., has announced a line of tapes which includes a four-coated ravel-free friction tape; a quick-fusing high-dielectric rubber tape; and a two-in-one plastic electric tape. The plastic electrical tape provides for both insulation and protection against weather and mechanical abuse. Constructed of strong vinyl plastic, the tape has a dielectric strength of over 8,000 volts and is highly resistant to acids, alkalis, corrosive salts, water, oils, greases, and alcohols.

The minimum thickness (0.007 inch) of the plastic tape, plus its two-way stretch, permits a snug fit on irregular shapes and surfaces. A few layers provide effective insulation without bulk. Both tape and adhesive are free of corrosive substances.

## Combination Demagnetizer and Etcher Has Fiber Top to Eliminate Scratching Work

B. A. Taylor Co., 15100 Fenkell Ave., Detroit 27, Mich., has announced a combination demagnetizer and etcher which is available in a Standard and De Luxe



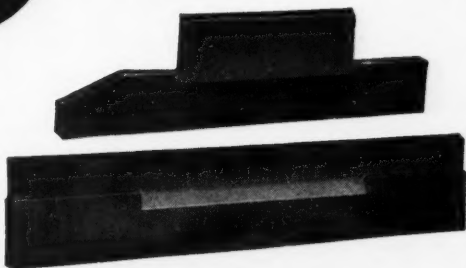
Taylor De Luxe Combination Demagnetizer  
and Etcher

type. The Standard type has four stations for varying the depth of etch, while the De Luxe type has eight positions for varying the depth of etch. Each type includes a fiber flat top to eliminate scratching of work; neon light to show when unit is in operation; and special alloy tip and ground clamp. The De Luxe type, which is said to be guaranteed against burning out for two years, also features variable demagnetizing, with full demagnetizing power obtainable by turning the switch to position No. 8.



Standard thrufeed and in-feed work support blades available from stock. Prices on special blades quoted on receipt of prints. We retip and regrind. Let us salvage your worn blades.

## CARBIDE TIPPED Work Support Blades for CENTERLESS GRINDERS

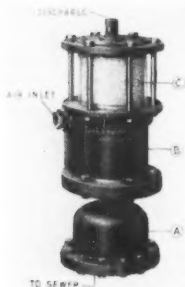


## WILLEY'S CARBIDE TOOL CO.

SOLE MARKERS OF WILLEY'S METAL

1342 W. Vernor Highway

Detroit 1, Michigan



## NEW-MURPHY TRIUMPH AA SEPARATOR-FILTER

This new unit will effectively drink up any moisture and oil as well as all vapors in your compressed air lines. Write today for complete information. Complete line of Aftercoolers, Separators and Traps.

Jas. A. Murphy & Co., Inc.  
1421 High St., Hamilton, O.

## BLANKING, NOTCHING, PARTING, EMBOSsing?

- FAST DIE CHANGES, with standard Punches and Dies.

- 15 Ton capacity.

- 6" throat depth permits reaching to center of 12" piece.

- Large Punch Plate and Bed permits blanking over big areas.

- Patented Leaf Assembly provides positive punch and die alignment.

Diagram illustrates versatility of Press—each blanking done with 1 stroke.

Tool your jobs quickly, economically with our wide variety of standard punches and dies.

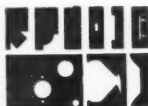
Write now for illustrated catalog and circular showing punches and dies available from stock.

LESLIE WELDING CO., 2940 Carroll Ave., Chicago 12



Leslie Model A Hand Punch Press

\$120.00  
F.O.B.  
Chicago



## Dial Indicator Gage Designed for Checking Large Diameters

Originally designed for use in the jet industry, a dial indicator gage which is adaptable for checking large inside or outside diameters in various other industries has been announced by Boice Mfg.



Boice Dial Indicator Gage

Co., Box 1098, Poughkeepsie, N. Y. The gage is of a light tubular construction and is available with any style indicator required for a particular measuring operation. The gaging contact is retractable so that the gage can be inserted into the bore. Depth of gaging is controlled by rests which contact the face of the work-piece.

## Flexible Coupling for Applications up to 10 H.P.

A small, compact, durable, cast iron, bushed type flexible coupling for applications up to 10 h.p. that is said to offer as many as 210 possible bore combinations has been announced by New Products Division, Maurey Mfg. Corp., 2908 S. Wabash Ave., Chicago 16, Ill. In the coupling two cast iron hubs are joined by a bonded rubber section.

The coupling is available in three bore sizes for use with the three standard Maurey types of interchangeable bush-

## Monarch VISE ACTION CLAMP

For Toolmakers — Inspectors — General Machine Work  
Woodworkers — Fabricators

- Grips The Work Straight • Like A Vise • Without Side Slipping  
• Fast - Positive - Lightweight • Tough Aluminum Alloy Jaws  
• Capacity to 4 1/2 Inches

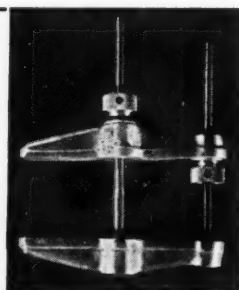
One of the most efficient clamps ever desired for Strength, Holding Power, Capacity, Quick and Easy Operation.

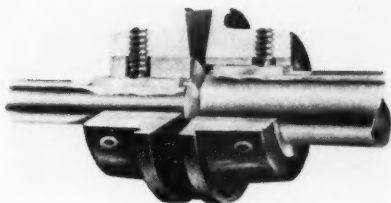
Try them, you'll want more—low price.

Dealers Desired

\$3.50  
per clamp

C. B. TEETER, TOOL ROOM SPECIALTIES  
4470 Oakwald Ave., Chicago 15, Ill.





Cutaway view of Maurey Flexible Coupling

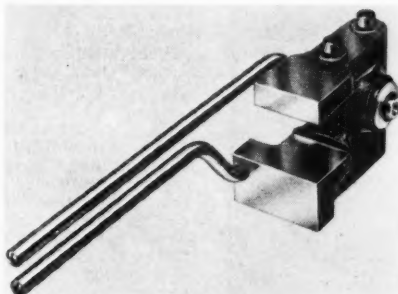
ings. The smallest size of coupling is 1-inch bore and offers 21 possible bore combinations. With the larger  $1\frac{1}{2}$  and  $2\frac{1}{8}$ -inch bore sizes there are 136 and 210 possible bore combinations respectively for each unit.

### Jig Is Designed for Accurate Drilling of Extremely Small Parts

Esco Engineering Corp., 1940 E. Woodbridge St., Detroit 7, Mich., has announced the Jr. "Mijit" Precision Drill Jig which is designed for use in the accurate drilling of extremely small parts. An outstanding advantage of the jig is that it is self-clamping in any position, using the same handles for locking the part and for locating and holding the fixture under the drill. It is easily adapted to various size parts within its range up to  $1\frac{1}{2}$  inches. All working parts, including posts, rack, and gear, are hardened and ground to close limits.

The shut height of the jig is infinitely variable from 1 to  $1\frac{1}{2}$  inches. The working area is  $1 \times 1\frac{1}{8}$  inches. The jig measures  $1\frac{1}{4} \times 2\frac{1}{4}$  inches at the base and is  $2\frac{1}{4}$  inches high in the closed position. The locking handles are 6 inches long.

Jr. "Mijit" Precision Drill Jig



September, 1952

**Air-O-Chek**  
THE VALVE WITH  
THE INTERNAL  
FULCRUM LEVER

Model FA

Model A

For blowing chips from work — For cleaning out hollow sets, machine recesses and tee slots — For drying parts before inspection and for many similar uses, Air-O-chek is the Air-gun.

Write for details.

**AIR-WAY PUMP & EQUIPMENT CO.**  
1046 N. Kilbourn Ave. Chicago 51, Ill.

## DRILLMASTER

### VERTICAL HYDRAULIC DRILLING MACHINES

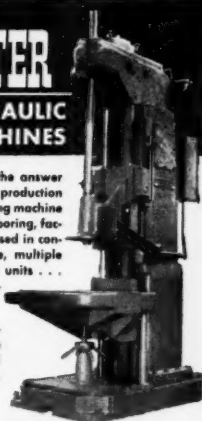
The DRILLMASTER provides the answer to a multitude of modern production problems. This precision drilling machine is ideal for drilling, reaming, boring, facing, and tapping... when used in conjunction with indexing table, multiple drilling heads and auxiliary units... many time consuming operations can be combined.

DRILLMASTER vertical hydraulic drilling machines are available in five models, 5 h.p.,  $7\frac{1}{2}$  h.p., 10 h.p., 25 h.p., and 50 h.p.

Write today for the DRILLMASTER technical bulletin.

**STANDARD MACHINE & TOOL CO., LTD.**  
**WINDSOR, ONT.**

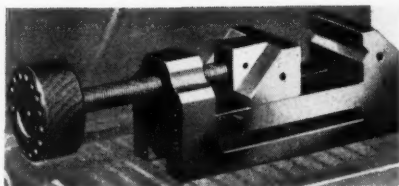
BRANCH OFFICE—LEASIDE, ONT.  
U. S. & Sales Representatives: Arnold J. Warner Co., New Center Bldg., Detroit 7, Mich.



MODERN MACHINE SHOP 411

## Gage Vise Reduces Machining and Set-Up Time

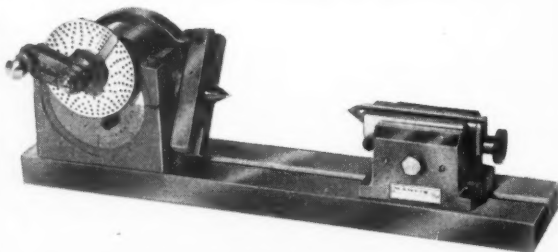
Designed to provide an improved means of rigidly and accurately clamping workpieces for machining operations in both production and toolroom applications, a gage vise which is claimed to be accurate to within 0.0003 inch on five surfaces is now being manufactured by Erickson Tools Division, 2303P Hamilton Ave., Cleveland 14, Ohio. According to the manufacturer, a series of accurate operations can be performed without once removing the work from the vise. In addition, the extreme accuracy of the vise surfaces is



Erickson Gage Vise

claimed to save considerable time spent in checking work as it progresses.

The Erickson Gage Vise is made of high grade tool steel which is properly hardened and accurately ground throughout. The jaw opening is  $2\frac{1}{8}$  inches, and the body dimensions are  $2\frac{3}{8}$  inches square x 6 inches long. The total weight if the vise is  $7\frac{1}{2}$  pounds.



## NEW MARVIN SURFACE GRINDER DIVIDING HEAD

NO. D-1435

Write for complete information  
and

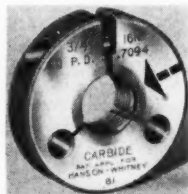
The Name of Your Nearest Distributor

 **MARVIN** Machine Products Inc.

414 FORD BUILDING • DETROIT 26, MICHIGAN

## Carbide Thread Ring Gage

The Hanson-Whitney Co., Hartford 2, Conn., has announced a car-



Hanson-Whitney Carbide Thread Ring Gage

bide thread ring gage designed for the volume gaging of identically sized threads. Because of the extreme hardness and wear resistance of the inserted carbide thread segments,

the ring is said to maintain its initial accuracy over extended periods of time and through continuous use.

The Hanson-Whitney Carbide Ring Gage is available in various sizes, can be reserviced for wear, and may be used as a master or reference ring.

### Improved Drill Grinder Features $\frac{1}{8}$ to $2\frac{1}{2}$ -Inch Capacity

Recent improvements in the Sterling Model D Drill and Carbide Grinder marketed by McDonough Mfg. Co., 1521 Gallo-way, Eau Claire, Wis., include increased capacity for handling drills from  $\frac{1}{8}$  to  $2\frac{1}{2}$  inches in diameter. The drill is positioned by means of the lip being ground to assure maximum accuracy. Adjustment for drill size can be easily affected, and the clearance angle may also be easily adjusted as required.

A built-in wheel dresser is standard equipment, and an additional feature is automatic compensation for wheel wear. According to the manufacturer, the improved grinder permits three and four-lip core drills to be ground without any



Sterling Improved Model D Drill and Carbide Grinder

change in the machine or any special fixtures. The necessity of preserving centers in core drills for grinding purposes is said to be eliminated.

## *Victor's Specials Deserve Your Attention!*

### High Speed S.S. END MILLS

FIRST QUALITY . . . SURPLUS STOCK!

DOUBLE END—2 OR 4 FLUTE



1/16 to 3/8 by 32nds . . . . \$2.20  
13/32 to 1/2 by 32nds . . . . 2.80

ALSO AVAILABLE . . . 2 and 4 Flute up to 2" Diameter Double and Single End!

SINGLE END—2 FLUTE

1/16 to 3/8 by 32nds . . . . \$1.52  
13/32 to 1/2 by 32nds . . . . 1.92



SINGLE END—4 FLUTE

3/32 to 3/8 by 32nds . . . . \$1.40  
13/32 to 1/2 by 32nds . . . . 1.80



**VICTOR MACHINERY EXCHANGE, INC.**

DEALERS IN TOOL ROOM EQUIPMENT

251-B Centre St. • New York 13, N. Y. • Phone: CAanal 6-5575

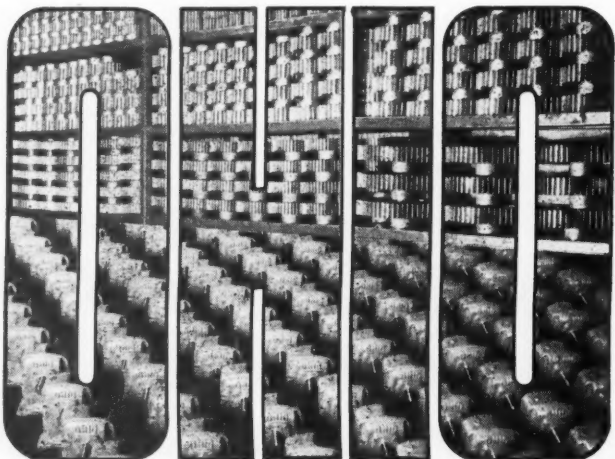
## 18-Inch Drill Press Is Recommended for General-Purpose Use

The Clausing 18-Inch Heavy Duty Drill Press now being manufactured by Clausing Division, Atlas Press Co., 2346 N. Pitcher St., Kalamazoo, Mich., is said to be ideal for production, toolroom, maintenance, and service shops. Of massive construction, the machine features a drive spindle supported by two sealed-for-life ball bearings, one above and one below the pulley. The durable precision-ground spindle is floated free from the quill by a

sealed-for-life ball bearing at the top and a double-row bearing at the bottom, both races in the double-row bearing absorbing thrust. Additional features of the machine include a vernier depth stop with control accurate to 0.0001 inch; 6½-inch spindle travel; positioning mechanism which moves both head and table; hinged motor support; and precision ground base.

Designed to operate from a ¾ to 1½ h.p. motor, the Clausing 18-Inch Drill Press is said to drill to the center of an 18¼-inch circle and has a capacity for drilling a ¾-inch diameter hole in steel

and 1-inch diameter hole in cast iron. The machine is equipped with a 63/64-inch spindle with No. 3 Morse



● Ohio Gear is setting New Standards — New Standards in quality and accuracy — New Standards in uniform precision — New Standards in every detail of workmanship.

Whether it is a single gear, sprocket or speed reducer, an intricate drive, or precision engineering, you will find Ohio Gears and Reducers fit your specifications in every detail of material, machining, and finished dimensions. Call your nearest distributor or write direct.

ESTABLISHED 1915  
**THE OHIO GEAR COMPANY**  
1303 EAST 179th STREET  
CLEVELAND 10, OHIO



Clausing 18-Inch  
Heavy Duty Drill  
Press

taper and 6½-inch travel. The maximum distance from the spindle to the table is 39 inches and from the spindle to the base, 50 inches. The machine can be furnished with a 13 x 18-inch production oil table or 12 x 14-inch tilting table.

## Universal Dial Test Indicator Features Lightweight, Sturdy Design

Designed so that it is light in weight but very substantial, a universal dial indicator announced by The Lufkin Rule Co., Saginaw, Mich., is said to be unusually adaptable for use in connection with a height gage or surface gage, as well as for use in determining surface flatness, alignment, out-of-roundness, relative heights, locations, and so on. Available in two models, the indicator includes a



Lufkin Universal Dial Test Indicator

base and shank of one-piece construction which is claimed to result in an assembly that cannot be loosened, even under severe use. Since the mechanism is mounted on the one-piece base and shank, rigid and accurate alignment of the moving parts is provided independent of the case.

Equipped with a jeweled thrust bearing which is claimed to increase the smoothness of operation and ensure accuracy and long life, the indicator includes an improved hole attachment which screws directly into the base, thus eliminating the need for extra overhanging or supporting arms. The outside knurled ring contains the dial and is adjustable so that the zero can be set to any position in relation to the pointer.

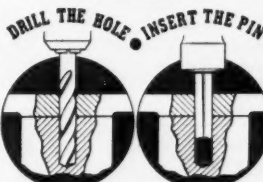
**Speed Assemblies  
WITH  
GILLEN GROOVE PINS  
WITHOUT  
Threading • Tapering • Reaming**

### GILLEN GROOVE PINS

#### Cut Fastening Costs—Save Time

Simple, Fast, Sure! Just drill the hole, insert the pin. Three longitudinal grooves expand the pin. It re-forms to shape of hole when inserted. GILLEN GROOVE PINS hold tight; yet they remove without damage to holes. GILLEN PINS improve assembled appearance. Millions are used by industry to do a better job at lower cost. Investigate GILLEN GROOVE PINS for your production line.

**Here's How Easy GILLEN  
GROOVE PINS Do It:**



#### Put 'em together...FAST

Speed assembly time uniting fixed or moveable members. Five types of GILLEN PINS meet nearly every fastening requirement.

#### Keep 'em together...SECURE

GILLEN GROOVE PINS fit tight at every point of hole circumference, making safe, positive anchorage, not affected by vibration or shock.

#### Take 'em apart...EASY

For replacement or repair, simply tap out the GILLEN PIN; re-use it. B-1112 and C-1010 zinc plated steel used. Also available in other metals, or plated to specifications.

#### Start Saving Now...

Get them from GILLEN—SEND THIS COUPON  
JOHN GILLEN COMPANY INC., CICERO 50, ILL.  
Send sizes and prices on Gillen Groove Pins

Name \_\_\_\_\_  
Company \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_

Attach this to your letterhead

TRY FREE SAMPLE PINS  
Specify approx. Diam. and Length Wanted

2542 S. 50th Ave., Cicero 50, Ill.



## Electrically Lighted Magnifier Speeds Detailed Examination of Materials

An electrically lighted magnifier for general industrial use has been announced by Bausch & Lomb Optical Co., 50507 Bausch St., Rochester 2, N. Y. Designed to speed the detailed examination of all kinds of materials and products through self-contained direct illumination of the object, the instrument is furnished equipped with either of two types of illuminator handles—one battery-powered and the other for connection with a 110-volt power



Illustration showing Bausch & Lomb Electrically Lighted Industrial Magnifier being used to inspect a machine part. Shown in the foreground are the alternative battery-powered illuminator handle, non-illuminating handle, and metal tripod furnished with the magnifier.

## BEARINGS

BALL BEARINGS • ROLLER BEARINGS

ALL SIZES — ALL TYPES  
WRITE OR WIRE YOUR NEEDS

NEERUP INDUSTRIAL EQUIPMENT

2137 1/2 SOUTH WABASH AVENUE, CHICAGO 16

## KELLY *Fast Grip Toggle* CLAMPS

**FEATURES:** More Positive gripping control—Balanced design—Efficient operation. Clamps for: Welding, wood-working; drill press; gluing and assembly.

Write for Literature.

R. J. KELLY MFG. CO.

P. O. Box 61 (Broadway Sta.), Newport, R. I.



Model 257

source. Either handle fits a reflector-type shade into which the magnifier snaps.

Accessories furnished with the magnifier include a non-illuminating handle and a metal tripod which multiply the uses of the magnifier. The lens system of the instrument magnifies five times and is highly corrected to eliminate virtually all spherical and chromatic aberration and distortion. It has a wide, flat field.

## Roller Coater Applies Compound to One or Both Sides of Metal

The Union Tool Corp., Warsaw, Ind., has announced a roller coater which is equipped with three sets of rolls, automatic infeed, and off-bearing conveyors.

# SAVE

TIME and MONEY  
with

GARBERDING

**STOP-PINS**  
AVAILABLE IN 5 SIZES



**FINGER STOPS**  
IN 3 SIZES



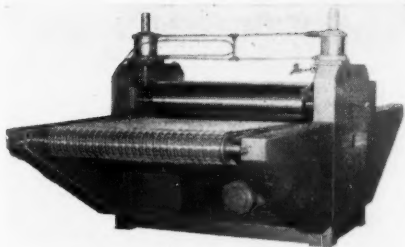
**STOP-PINS** are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch. No threads inside **STOPS** for springs to catch on. Write for literature and prices.

**GARBERDING FINGER STOPS** made in uniform width to fit any standard width slot. Just grind ends to fit.

Write for literature

**TWENTIETH CENTURY  
MANUFACTURING CO.**

Route 176 and Bradley Road, Libertyville, Illinois



Union Tool Roller Coater

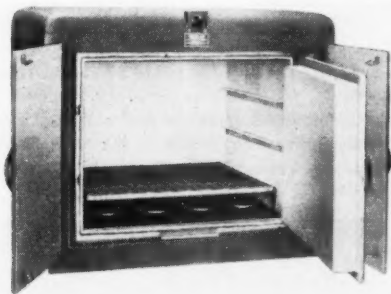
Rubber nip rolls convey the workpiece from the infeed conveyor through a set of brush rolls for cleaning and then through a set of hardened steel coating rolls. Doctor rolls, controlled by a calibrated handwheel with micrometer adjustment, accurately gage the thickness of the compound coating. Pressure on the coating rolls is applied by two 6-inch diameter air cylinders which are said to be capable of producing pressures from 0 to 160 lb. The air cylinder circuit includes a regulator, gage, oiler, and filter.

Excessive pressure behind the coating rolls provides a deburring action on the workpiece and also supplies the necessary pressure to press the compound into the pores of the metal. The coating rolls can be adjusted for stock thicknesses of from 30 gauge to  $\frac{1}{2}$  inch and are capable of handling widths from 1 to 112 inches. The machine can be used to apply compound to one or both sides of the metal.

### Portable Oven Incorporates Inconel Tubular Heater

Designated as the Model HT-2, a portable electric oven designed for high tem-

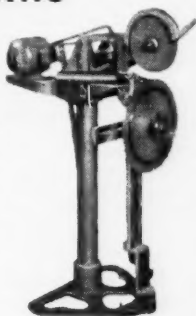
Grieve-Hendry Model HT-2 Portable Oven



## HANCHETT No. 136

### CIRCULAR SAW SHARPENER FOR WOOD SAWS MANUAL OPERATION

For rip and cross-cut saws from 6" to 36" dia., with teeth spaced from 10 points per in. to 2 in. spacing. Belt or motor drive.

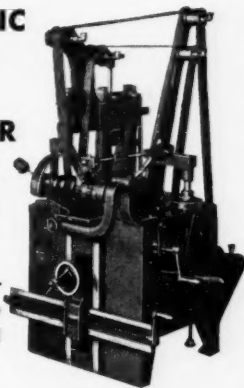


## HANCHETT No. 724

### FULL AUTOMATIC CIRCULAR SAW SHARPENER

Now Available  
with Hanchett  
Air Shift.

6" to 36" dia.—  
other sizes up to  
84" dia. and  
larger.



## HANCHETT Manufacturing Co.

World's Largest Mfrs. of  
Saw & Knife Machinery

Main Office:

BIG RAPIDS, MICH.

West Coast: Portland 4, Oregon



perature processing and equipped with an Inconel sheathed sealed tubular heating element for maximum heating efficiency has been announced by Grieve-Hendry Co., 1101 N. Paulina St., Chicago 22, Ill. The oven features a thermostat control with a temperature range of 300 to 1,000 deg. F. and a stainless steel interior. Constructed of heavy-gauge steel with a minimum of 4 inches of Fibreglass insulation, the oven has double doors which seal in heat.

The oven measures 30 inches wide x 25 inches deep x 24 inches high on the outside, and 22 inches wide x 18 inches deep x 16 inches high on the inside. The oven is designed for 220-volt single-phase current. A drip pan, lower shelf, pilot light, and outside reading thermometer are standard equipment.



"Red Arrow" Lift Truck

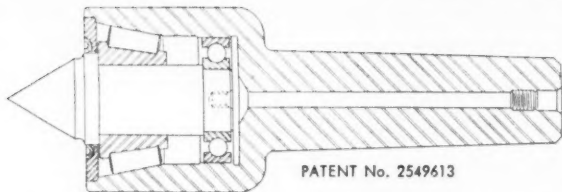
### Lift Truck Has Quick Action

Known as the "Red Arrow," a lift truck designed to provide for easy rolling, safety, easy lifting, and easy steering, as well as quick, automatic action, has been announced by Lift Trucks, Inc., 2423-2435 Spring Grove Ave., Cincinnati 14, Ohio. The truck which is available in three models with capacities of 2,500, 3,500, and

5,000 lb., features a double-sealed compression check, malleable alloy iron or steel wheels, malleable alloy castings, tapered roller bearings, a machine-bolted frame, automatic engagement and disengagement of handle, and sealed ball bearings.

# PERFECTION

**FREE CENTER  
GUARANTEED FOR ONE YEAR  
ECCENTRICITY TOLERANCE  
LESS THAN .0001"**



● This year guarantee (or 3000 hours continuous operation) is made possible by simplicity of the design with only six parts including the shank plug.

Other features include absolute concentricity and perfect alignment for the two bearings, both conical and cylindrical bores of the body are ground at the same setting in the work head. Perfection Free-Centers can be furnished to meet your requirements to any capacity up to the limit of roller bearings. Write today for descriptive folder.

**MECHANICAL DEVELOPMENT CORP.** 1627 BEAVER AVE.  
PITTSBURGH 33, PA.

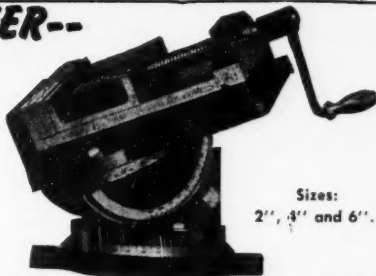
## MAKE SET-UPS **FASTER--**

Conserve valuable production time by using the fully universal, easily-operated MASTER MULTI-SWIVEL VISE for intricate, angular set-ups in your shop. Three swivels instantly set any compound angle. Used in shops throughout the world. Interchangeable platen optional.

Write for Circular

**DONOVAN MFG. CO.**

80 BATTERYMARCH ST., BOSTON 10, MASS.



Sizes:  
2", 3" and 6".



Use  
**THE RECIPRO-TOOL**  
Heavy Duty Industrial Type  
Marking Tool for fast,  
easy die and parts marking.

**Carbide or Diamond Tip**

In Daily Use by  
Sub-Contractors

Vendors in Parts Marking  
Now Available

**Lifelong**  
**CARBIDE SCRIBERS**

**Lifelong** outlasts other  
Scribers many times.

**Lifelong** Is Sharp.

**Lifelong** Stays Sharp.

**\$1.25 ea.**

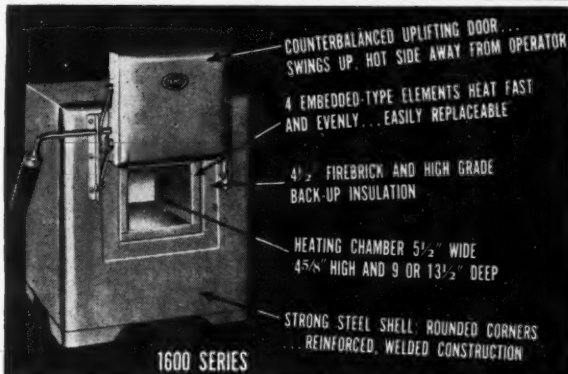
WRITE FOR CIRCULAR ENCLOSING NAME AND  
ADDRESS OF YOUR MILL SUPPLIER



**SC&L MACHINE CO.** 1121 FOURTH AVENUE  
ROCKFORD, ILLINOIS

**solve  
heat-treat  
problems**

with versatile  
**Temco bench-  
type furnace**



Step up production, cut costs with Temco electric furnaces for heat treating dies, parts, tools, etc. Model illustrated above one of eight convenient sizes available with either electronic or manual temperature controls. Economical, easy



**ELECTRIC  
FURNACES**

to install and operate, low cost. Priced from \$55.00 to \$507.50. Write for literature and nearest dealer's name.

**THERMO ELECTRIC MANUFACTURING CO.**

**488 HUFF ST., DUBUQUE, IOWA**

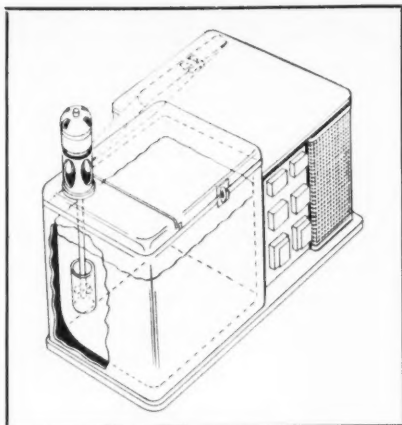
September, 1952

MODERN MACHINE SHOP 419

## Modified Chilling Machine Chamber Provides Maximum Heat Transfer

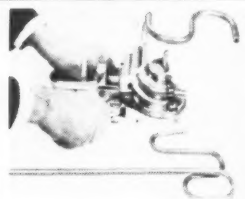
To obtain maximum heat transfer, a modification of the chilling chamber of its industrial chilling machines has been announced by Sub-Zero Products, 3932 Reading Rd., Cincinnati 29, Ohio. The principal effect of the modification is to obtain complete circulation of the convex fluid in the chamber six times per minute.

Circulation is effected by a mixer mounted in the left rear corner of the chamber. A 3-blade 4-inch propeller, the



Isometric drawing of cutaway view of Sub-Zero Industrial Chilling Machine showing modification of chilling chamber to provide for maximum heat transfer

## SHORT-RUN PIPING JOBS Completed Faster . . . and at Lower Cost . . . with



# TAL

**Portable  
Pipe and  
Tube  
BENDERS**

Why spend the time to cut and thread pipe . . . then patch it together with costly fittings? It's faster, cheaper and better to *bend pipe and tubing on-the-job* with a Tal Prestal Bender. Any man can quickly complete smooth, streamlined bends . . . in one setting, without shifting the pipe. Benders available for pipe diameters from  $\frac{1}{4}$ " to 6".

Write for Free Bulletin

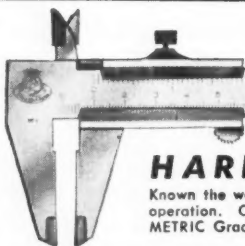
DEPT.  
46

**TAL BENDER, Inc.**

417 N. WATER ST. • MILWAUKEE 2, WIS.

mixer is enclosed in an 8-inch draft tube with  $6\frac{1}{2}$ -inch clearance at the bottom and a maximum of 2-inch clearance between the top of the tube and the fluid level. A fillet is mounted in the bottom corner to direct the flow of the fluid across the bottom of the chamber. The mixer is powered by an external top-mounted motor. The section of lid in which the motor is mounted is fixed.

Primary applications for the chilling chamber modification are expected to be found in operations involving mass production chilling of metal parts, as, for example, in the chilling of bearings for dimensional stability. The modification is available on special size units and on Sub-Zero's standard Model R-120 chilling machine which has a thermal capacity of 2,000 B.T.U. per hour.



**ETALON No. 17** \$21.95  
F.O.B., N.Y.

## HARDENED STAINLESS STEEL

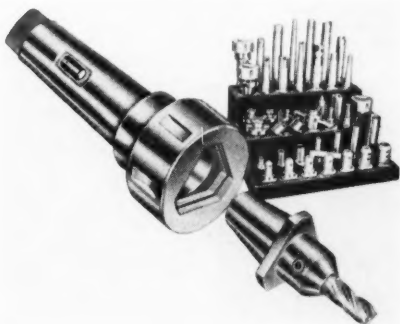
Known the world over for fine accuracy. Hand fitted vernier assures smooth, snug operation. COMPLETELY GUARANTEED. Supplied in ENGLISH or METRIC Graduations. Furnished in handsome form fitting wooden case.

ASK YOUR DEALER or write

ALINA CORPORATION • 401 Broadway • New York 13, New York

## Quick-Change Toolholder Features Triple-Locking Arrangement

Designated as the P.D.Q. (Portage Double Quick), a triple-lock toolholder



P.D.Q. (Portage Double Quick) Toolholder and Adapter Set

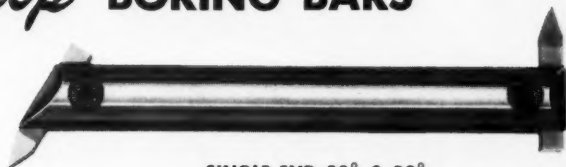
with a locking feature that is said to permit fast tool changes and assure constant

repositioning has been announced by The Portage "Double-Quick" Tool Co., 1041 Sweitzer Ave., Akron, Ohio. The three-point holding arrangement of the unit in combination with the taper shank design is said to eliminate "runout" on precision work.

The toolholder is offered in a 57-piece set which includes holders and adapters for boring, milling, and lathe applications. Boring mill holders have Nos. 4, 5, and 6 Morse taper shanks and Nos. 40 and 50 taper shanks for milling machines. Turret lathe adapters are designed to fit any turret lathe. End mill adapters range in size from  $\frac{3}{8}$  up to  $1\frac{1}{4}$  inches. The boring bar holder accommodates either a straight or 30-degree angle bit and is available in sizes measuring 3, 6, 9, and 12 inches in length. The boring head features accurate micrometer adjustment. Also included in the set are adapters for shell mills, end mills, drill chucks, and boring heads. A wooden rack especially designed for the set is available as optional equipment.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.

## Shuregrip BORING BARS



### DOUBLE END 30° & 90°

Number	1-A	2-A	3-A	4-A	5-A	6-A	7-A
Bar, Dia. In	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$
Length In	7	8	9	11	13	18	23
Cutter In	$\frac{1}{8}$ Rd.	$\frac{3}{16}$ Rd.	$\frac{1}{8}$ Sq.	$\frac{1}{4}$ Sq.	$\frac{3}{8}$ Sq.	$\frac{1}{2}$ Sq.	$\frac{3}{4}$ Sq.
Price Each	1.95	2.10	2.95	3.25	4.55	10.75	20.80

Adjustable Boring Bar holders available take bars from  $\frac{3}{8}$ " up to  $1\frac{1}{2}$ " diameter. T-Blocks made to fit any lathe. Price list on request.

**WRITE FOR PRICE  
ON LARGER BARS**

### SINGLE END 30° & 90°

When Ordering—State Angle Required	1-B	2-B	3-B	4-B	5-B	6-B
Number	1-B	2-B	3-B	4-B	5-B	6-B
Bar, Dia. In	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{4}$	1	$1\frac{1}{2}$
Length In	3	4	5	7	8	10
Cutter In	$\frac{1}{8}$ Rd.	$\frac{3}{16}$ Rd.	$\frac{1}{8}$ Sq.	$\frac{1}{4}$ Sq.	$\frac{3}{8}$ Sq.	$\frac{1}{2}$ Sq.
Price Each	1.25	1.35	2.20	2.50	2.60	2.80

### BREAK OFF ON SCORE, AS REQUIRED

1-6" Length— $\frac{1}{8}$ Dia. H.S.S. Tool Bit Stock—Hardened—each	95¢
1-6" Length— $\frac{3}{16}$ Dia. H.S.S. Tool Bit Stock—Hardened—each	\$1.05
Round Tool Bits Furnished in 1-A, 2-A, 1-B and 2-B—All Others Square, 1 Hexagon Wrench Furnished with Each Bar.	
Price of Square H.S.S. Cutter Bits.	$\frac{1}{8}$ x1 $\frac{1}{4}$ $\frac{3}{8}$ x1 $\frac{1}{2}$ $\frac{1}{2}$ x1 $\frac{3}{4}$
	.20 .30 .40 .65

# J. E. FREYMAN & SONS, INC.

3627 KESWICK RD.

BALTIMORE 11, MD.

## NEW SHOP LITERATURE

**Lathe Center Lubricant.** A four-page folder issued by The Alpha Corp., 174 Hamilton Ave., Greenwich, Conn., describes its "Molykote-Centerlube" for use on lathe centers and steady rests. The lubricant is also used for press fitting, heavily-loaded gears, ways of machine tools, gibs, and so on.

**High-Pressure Solenoid Valves.** An eight-page two-color bulletin offered by Geo. F. Marchant Co., 1420 S. Rockwell Ave., Chicago 8, Ill., fully describes and illustrates Waterman High Pressure Solenoid Valves which are suitable for all hydraulic systems handling non-corrosive fluids. Dimensional drawings of the various types of valves are included.

**Toolbit Collet.** The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., has published a four-page two-color bulletin (No. 51-828) which illustrates and describes in

detail the DoAll Toolbit Collet for use in single-point and multiple set-up boring, facing, and flycutting operations and adaptable for use on boring mills, lathes, turret lathes, automatic screw machines, and milling machines.

## NEWCOMER CARBIDE Specialists will gladly show you how to



*Make Cuts Like this*

WITH THE  
NEW GRADE

**S-6**

CUTTING  
CARBIDE



### Highlights of the NEW S-6

Write today for  
Catalog No. 108  
which shows all  
other standard  
grades of New-  
comer Carbides.



S-6 Carbide is new and different — industry-proven on machining Armor plate, rough steel forgings and castings. Even though S-6 Carbide can be used at high machining speeds, its greatest tool life is obtained at speeds slower than those at which other grades of carbide can be successfully used. S-6 removes stock fast because of the heavy feeds permissible. S-6 Carbide, because of its extremely high strength, is excellent for interrupted cuts.

**NEWCOMER PRODUCTS, INC.**

General Sales Offices

**PITTSBURGH 21, PENNA.**

Plants at LATROBE, PENNA.

**Gear Hobbing Machine.** A 12-page bulletin (1458-52) describing the Michigan Model 1458-A Ultra Speed Gear Hobbing Machine for production use is now available from Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. Included in the profusely illustrated two-color bulletin are complete design and operating descriptions, tooling layouts for hydraulic clamping, and general machine specifications. A sequence of illustrations shows how the machine accurately hobs the teeth of two 3 $\frac{1}{2}$ -inch diameter helical gears with a 1 $\frac{1}{2}$ -inch total width in 58 seconds.

**Precision Toolroom and Engine Lathe.** The Cincinnati Universal Machine Co., Orchard St., Cincinnati 12, Ohio, is now offering a four-page two-color bulletin containing illustrated and descriptive information on the features and specifications of the Weipert Precision Toolroom and Engine Lathe which has 18 spindle speeds from 12 to 600 r.p.m. and may be used for chasing English, metric, and module threads.

**Drill Jig Bushings.** A six-page folder listing quantity net prices for Colonial A.S.A. Standard Drill Jig Bushings is available from Colonial Bushings, Inc., 31780 Groesbeck Highway, Fraser, Mich. Prices of all fixed renewable, slip renewable, and head press fit jig bushings, as well as headless, headless press fit, and head type liners, are included.

**Straight-Side Double-Crank Presses** with capacities ranging from 50 to 2,000 tons are described and pictured in a 20-page two-color catalog (No. 17-D) issued by E. W. Bliss Co., Canton, Ohio. The catalog lists detailed specifications and dimensions of the presses and also describes several types of Bliss clutches.

**Air Control Valves.** An eight-page two-color bulletin published by Valvair Corp., 454 Morgan Ave., Akron 11, Ohio, describes and illustrates a line of air control valves comprising three basic body designs in five types of five sizes for all nine control assemblies. These include knob, lever, cam, clevis, foot, treadle, cylinder, diaphragm, and solenoid valves.

**Short-Run Stamping Service.** Federal Tool & Mfg. Co., 3600 Alabama Ave., St. Louis Park, Minneapolis 16, Minn., has prepared a four-page illustrated bulletin (No. 161) describing its one-stop short-run stamping service, which includes short-run metal stampings, phenolic stampings, special wrenches, and name plates, all die stamped to user specifications.

**Lubrication Process for Cold Extrusion.** An eight-page illustrated booklet issued by Detrex Corp., Box 501, Detroit 32, Mich., fully describes a phosphate coating and lubricating process which makes possible the cold extrusion and forming of steel. The process, known as Extrudite, is said to be applicable to both carbon and stainless steels.

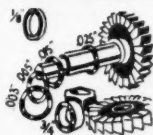
## GRAND OFFERS FROM STOCK



### PRECISION GROUND ARBOR SPACERS

Hardened and ground with keyway

Width inch.	1/2" bore 1 1/2" O.D.	1" bore 1 1/2" O.D.	1 1/2" bore 1 1/2" O.D.	1 1/2" bore 2 1/2" O.D.
1/8"	\$ .60 ea.	\$ .70 ea.	\$ .90 ea.	\$1.10 ea.
3/16"	.60	.80	1.00	1.25
1/4"	.70	.90	1.10	1.35
5/16"	.80	.90	1.10	1.50
3/8"	.80	1.00	1.20	1.60
1/2"	1.00	1.20	1.40	1.80
3/4"	1.20	1.40	1.60	2.00
1"	1.50	1.80	2.20	2.80
2"	2.50	2.70	3.20	3.90



### ARBOR SPACER SHIMS

For fast and accurate spacing of Milling Cutters, Gang Saws, Slitters, etc.

Each set one each shim as listed: .001, .0015, .002, .003, .004, .005, .006, .007, .008, .010, .012, .015, .020, .025, .032, .047, .062, .093, .125.

Di. of Hole	Outside Di.	Price per Set
1/2"	1 1/2"	\$1.50
1"	1 1/2"	1.50
1 1/4"	1 1/2"	1.50

All sizes loose shims are also available.



### PRECISION GROUND RUNNING BUSHINGS

Hardened and ground with keyway

No. of Bushing	Di. Bushing inches	Di. Hole inches	Length inches	Price Each
3—5/8	1 1/2	1 1/4	3 1/2	\$ 7.50
3—1	1 1/2	1	2 1/2	7.50
4—1	2 1/2	1	3 1/2	9.00
4—1 1/4	2 1/2	1 1/4	3 1/2	9.00
4—1 1/2	2 1/2	1 1/2	3 1/2	9.00
5—1	2 1/2	1	4 1/2	11.00
5—1 1/4	2 1/2	1 1/4	4 1/2	11.00
5—1 1/2	2 1/2	1 1/2	4 1/2	11.00



### MICROMETER ADJUSTABLE SPACING COLLARS

These collars save milling machine set-up time and eliminate the use of paper shims and thin steel washers. Quick and positive adjustments made without removing cutters from milling

arbor. Teeth accurately ground and graduated and protected from chips. Standard collars have .002 in. step adjustments. When ordering specify size bore only.

Bore	Collar	Keyway	Keyway
Di., in.	Thick in.	Width in.	Depth in.
1	7/16	1/4	3/32
1 1/4	2 1/2	1/2	3/16
1 1/2	2 1/2	3/8	1/8

**\$7.50 each**

**GRAND TOOL & SUPPLY CO., 174 Grand St., N. Y. 13, N. Y., WO. 4-6670-71**

**Pneumatic Collet-Closer.** A four-page two-color catalog (No. WM 1006) released by Williams Metal Products, 3713 Robertson Blvd., Culver City, Calif., describes and illustrates its "Wil-Numat" Pneumatic Collet-Closer which is adaptable to both production and toolroom operations.

**Hydraulic Duplicators.** A 20-page catalog published by Turchan Follower Machine Co., 8259 Livernois Ave., Detroit 4, Mich., illustrates and discusses some of the basic advantages of converting standard machine tools to operation by hydraulic tracer control.

**Double Angle Shears.** Kling Bros. Engineering Works, 1328 N. Kostner Ave., Chicago 51, Ill., has issued a four-page two-color illustrated bulletin (No. 2345) describing its double angle shears designed to handle flats, bars, and angles and to provide maximum production on short or long runs. Specifications of the four sizes of machines are included.

**Wrench for Socket Screws.** Eklind Tool & Mfg. Co., 2627 N. Western Ave., Chicago 47, Ill., has available literature which illustrates and describes the features and advantages of the "Hex-Uni-Key," a handy six-in-one wrench for socket screws.

**Dies.** A 16-page three-color brochure released by The B. Jahn Mfg. Co., New Britain, Conn., presents a graphic account of the company's facilities, as well as the manner in which its dies are "production proved."

**Toggle Clamps.** Robert J. Kelly Mfg. Co., P. O. Box 61 (Broadway Sta.), Newport, R. I., has released a two-color illustrated bulletin which describes its line of "Fast-Grip" toggle clamps for welding, woodworking, gluing, assembly and general fabricating processes, as well as automotive and aircraft production operations. Diagrams of each type clamp are included.



## **Grobet**

# **RIFFLERS**

**GROBET produces more RIFFLERS in more shapes and sizes than any company in the world.**

**SOLD THROUGH  
LEADING SUPPLY  
HOUSES.**

Send for Catalog BF3

**GROBET**  
**FILE CO. of**  
**AMERICA, Inc.**

**421 Canal Street**  
**New York 13, N. Y.**

Plants: New York  
Chicago - Montreal



Eight decades ago 70% of all gainful workers in the U. S. A. toiled in agriculture. Today farms and factories, put together, account for less than 40%.

The rest serve chiefly in distribution, which includes the physical movement of products to buyers, and all forms of selling, advertising and sales promotion.

Without sales a business fails and jobs vanish. No matter how good a product may be, it must be sold in competition with other goods. A salesman sometimes finds his products not truly competitive. He then exercises tremendous pressures on his employer for better products, lower prices, or both. Thus, competitive selling greatly influences the progress of American prosperity.

Countries where selling is inefficient, restricted or eliminated generate far less wealth, happiness and security.

Competition, especially competitive selling, is a great American Freedom. Let us preserve it to assure Progress For All Our People.

*THIS REPORT ON PROGRESS-FOR-PEOPLE is published by this magazine in cooperation with National Business Publications, Inc., as a public service.*

THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER OF PEOPLE



## COLLET EQUIPMENT

Use-Em-Up Type Drill Sleeves  
 Use-Em-Up Type Drill Sockets  
 Standard Type Drill Sleeves  
 Standard Type Drill Sockets  
 Short Shank Type Sleeves  
 Short Shank Type Sockets  
 B. & S. Taper to B. & S. Taper Sleeves  
 B. & S. Taper to Standard Taper Sleeves  
 Standard Taper to B. & S. Taper Sleeves  
 Rough Shank Sockets  
 Solid Type Sockets  
 Morse Taper Shank Tap Sockets  
 Standard Spot Facing Cutter Bars  
 High Speed Point Lathe Centers  
 Carbon Steel Lathe Centers  
 Pipe Centers for Lathes  
 Lathe Bushings  
 Blank End Arbors  
 Chuck Arbors  
 Drill Drifts  
 Magic Type Chucks and Collets

Standard tools for all drilling, reaming,  
 and tapping needs and special tools to  
 order. Immediate attention to regular or  
 special requirements.

**THE COLLIS COMPANY**  
**CLINTON, IOWA**

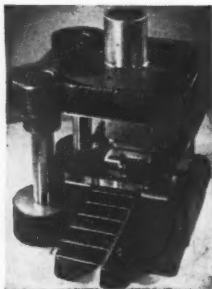
Dept. A

**Push-Button Controls.** A 12-page two-color catalog issued by The Arrow-Hart & Hegeman Electric Co., 103 Hawthorn St., Hartford 6, Conn., illustrates and describes the company's line of oil-tight push-button controls, including standard, extended and mushroom buttons; two and three-position selector switches; and pilots, together with suitable legend plates.

**Lathe and Grinder Centers.** A four-page two-color bulletin (No. 52-802) published by The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., contains illustrated, descriptive, and complete tabular information on DoAll Lathe and Grinder "Super-Centers" featuring replaceable tips of "Exmet" which are designed to withstand heavy wear and stress at high speeds and extremely high temperatures.

**Dresser Guide.** Designed for use in grinding departments, tool cribs, and so on, a 9 x 12-inch wall chart prepared by The Desmond-Stephan Mfg. Co., Urbana, Ohio, pictures each type of grinding wheel dresser in the Desmond-Stephan line and describes its application.

**Quick-Acting Toggle Clamps.** Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Chicago 50, Ill., has published a 12-page two-color catalog on its complete line of quick-acting toggle clamps, known as "Kwik-Klamps," which are designed for use in all types of work-holding and fixturing operations. Complete engineering data on all items in the line are included, together with actual illustrations. A helpful feature for designers is the detailed engineering drawing that accompanies each illustration. In addition, the catalog offers a complete set of scaled templates.



## NEW HEAVY WEST AUTOMATIC DIE STOP

HANDLES WORK UP TO  
 $\frac{1}{4}$ " THICK

**R. C. WEST TOOL & DIE CORPORATION** **DEPEW, NEW YORK**

**ANOTHER**  
***Viking***  
**“First”**  
**No Chip Breaker**

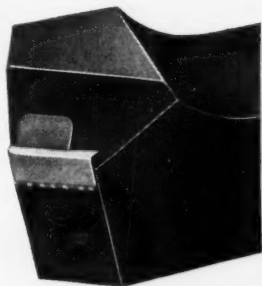
**Grinding**

**WITH VIKING V-BACK ADJUSTABLE CHIP BREAKER  
TURNING TOOLS**

**SAVE YOUR PRECIOUS  
DIAMOND WHEELS**

**Here's how...**

1. Separate chip breaker block and tool tip simultaneously locked in tool holder with one locking device.
2. Solid carbide block provides trouble free, long life chip breaker. No chip breaker grooves to grind into the tip each time tool is sharpened.
3. "On the job" adjustment of chip breaker to control the chip to meet variations in speeds, feeds, depth of cuts, and material machined.
4. Carbide to carbide contact of chip breaker block and tool bit allows no wedging of chip under breaker to fracture the carbide.



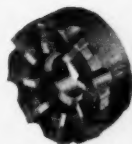
**WRITE  
FOR  
CATALOG**

Put Viking Tools to work in your shop. Compare the savings in Carbide and Diamond Wheels. Write for literature giving further detail.

Holders supplied in shank sizes from 3/4" to 2".

Straight turning, 20 degree lead angle, offset and facing tools.

Also . . . Manufacturers of Inserted Blade Milling Cutters



**IMPORTANT FEATURES:**

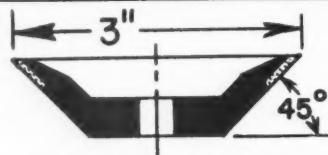
- |                      |                          |
|----------------------|--------------------------|
| 1. Low Initial Cost  | 3. Lower Sharpening Cost |
| 2. Longer Blade Life | 4. Easier Reblading      |

**VIKING TOOL COMPANY** SHELTON 15, CONN.

**"Metallic Cutting Off with Abrasive Wheels"** is the title of a booklet (No. 6) issued by The Carborundum Co., Dept. MM 81-82, Niagara Falls, New York.

**Universal Safety Vises.** A four-page two-color illustrated brochure describing the operation of both the drill press model and band saw model of its AMF Float-Lock Universal Safety Vise has been prepared by Float-Lock Corp., subsidiary of American Machine & Foundry Co., 511 Fifth Ave., New York 17, N. Y.

**HARDENED and GROUND HSS BLANKS**  
Any decimal diameter to  $\frac{1}{8}$ "—in any length.  
Mirror finish surface to gage tolerance. Many uses—punches, gages, measuring wires, special tools, etc. Quick delivery.  
Write for price list D-2  
**WILLIAM T. HUTCHINSON COMPANY**  
235 Main St. Orange, N. J.



## RESINOID BONDED DIAMOND WHEELS

**FAST, COOL CUTTING, LONG LIFE**

Prompt Deliveries • 4 - 5 Months  
on Bulk Orders, Two Weeks On  
Emergency Business • Industrial  
Diamonds • Diamond Tools •  
Diamond Powder • Mounted  
Points • Hones

Competitively Priced  
Please ask for new catalog

**Diamond Tool Research Co., Inc.**

305 E. 45th St. New York 17, N. Y.

T-1 Murray Hill 4-0466-7-8

**Dial Gages.** A 40-page catalog (No. D) prepared by Nilsson Gage Co., Inc., Poughkeepsie, N. Y., contains illustrated, descriptive, and tabular information on a line of dial gages, including small and large dial bore gages for checking internal diameters from  $\frac{1}{8}$  to 12 inches; dial snap gages for checking outside diameters; dial snap comparators for checking outside diameters; dial pitch diameter gages for checking pitch diameter of external splines and gears over removable rolls; dial groove gages for checking diameters of internal grooves and recesses. Truarc and "O" rings, oil grooves, washer grooves, and so on; and dial groove location gages for checking locations or depths of internal grooves.

**Chaser Sharpening Machine.** Jones & Lamson Machine Co., Springfield, Vt., has published an eight-page catalog (No. 503) which illustrates and describes in detail its new universal bench type chaser sharpening machine, which is specifically designed for resharpening both tangent and radial die chasers.

**Circular Sawing Machines.** The Motch & Merryweather Machinery Co., Penton Bldg., Cleveland 13, Ohio, has issued two four-page two-color bulletins, one of which (Bulletin No. 375) describes and illustrates the Motch & Merryweather No. 3 Circular Sawing Machine which is designed to accommodate saw blades of 32 and 34 inches maximum diameter for sawing solid rounds, squares, tubing, or structural shapes. The other bulletin (No. 475) contains illustrated and descriptive information on the Motch & Merryweather No. 4 Circular Sawing Machine that is designed for accommodating saw blades of 45 inches maximum diameter for cutting the same types of materials as the No. 3 machine.

## PRECISION SLIDE RULE

ACCURATE—DEPENDABLE  
Light Metal—Non-Warping.  
Slides Smoothly—Two  
Colored Scales on  
White Facings.  
MODEL 1511  
System Rietz  
10" long.

Incl. Box and Manual

**\$7.00**

Postpaid  
or C.O.D.  
F.O.B.

Floral Park

Scales on Face:

K-A-B-CI-C-D-LOG

On Reverse Side:

Metric-Sin-Tang-Inch

Money Back

Guarantee.

**THE RANDS CO.**

88 Chestnut Ave., Floral Park, N. Y.





# Van Keuren

## ORIGINATORS of WIRE TYPE PLUG GAGES

WRITE for the 1952 Van Keuren Catalog and Handbook No. 35. It contains specifications and prices on wire type plug gages and also Taper Insert Plug Gages up to 2.500" diameter.

*Specify* VAN KEUREN Wire Type Plug Gages on your drawings for all sizes from .010" to .500" diameter.

Taper Insert Plug Gages in this range are a waste of time and money.

### RECOMMENDED MATERIALS

#### High Speed Steel

Stocked in sizes from .010 to .050". Available at no extra cost.

#### Chromium Alloy Tool Steel

Standard for sizes .051 to 1.000".

#### Hard Chromium Plate

5 times the life of steel at 50% additional cost. Available in sizes from .016 to 1.000".

#### VK Carbide

50 times the life at 5 times the cost of steel. Recommended for close tolerance work and long runs. Available in sizes from .016 to .500" dia.

THE *Van Keuren*

33rd YEAR

CO., 175 WALTHAM STREET, WATERTOWN, MASS.  
Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carbide Plug Gages • Carbide Measuring Wires

# services directory

grinding  
stamping  
tool and die work  
machine work  
castings  
heat-treating  
forgings  
employment  
business, etc.

## GRIND THE *Eastern Centerless Way*

Our new plant with  
increased facilities  
assures

### PROMPT SERVICE

**Eastern Centerless Grinding Co.**  
470 Tolland Street East Hartford 8, Conn.

## CENTRIFUGAL CASTINGS...

*Better*

*for most castings*

*Best*

*to prevent gas and  
liquid leaks*

For details, write for booklet.  
American Non-Gran Bronze Co.,  
Berwyn, Pa.



## PATTERNS

Wood and Metal — also Match Plates.  
For all kinds of castings—large or small.  
*Estimates on Request.*

### GENERAL PATTERN WORKS

2231 Buck St., North of Harrison Ave.  
Phone MAin 4751 Cincinnati, Ohio

## BAKELITE SILENT GEAR SERVICE

ALL SIZE BLANKS IN STOCK.

Teeth Cut To Your Specifications.  
Prompt Delivery. Write for quotation.

### Greaves Machine Tool Co.

division of J. A. Fay & Egan Co.  
2700 Eastern Avenue Cincinnati, Ohio

**CENTERLESS GRINDING** — Straight cylindrical, shoulder, profile and multiple diameters, any material analysis; also non-ferrous materials. Accurately ground taper pins and straight dowel pins. Brown & Sharpe and Swiss Automatic screw machine parts, heat treated and ground if necessary. Light bench type production drilling. Expanded facilities insure prompt and accurate service. Send blue prints or samples for estimates. The Porter Machine Co., 3139 Enyart Ave., Cincinnati 9, Ohio.

## CENTERLESS GRINDING

Specialists in taper and profile grinding.  
Automatic loading and sizing devices assure prompt and economical service.

### FOULK MANUFACTURING CO.

4208 Airport Road Cincinnati 26, Ohio

## ADVERTISING RATES

for Services Directory

Write Modern Machine Shop

SENT UPON REQUEST

431 MAIN ST., CINCINNATI 2, OHIO

## DO YOU NEED AN AGENT?

Our organization, now successfully covering northeastern Ohio, represents six manufacturers of industrial tools. We proudly point to yearly increases in this area for each of these companies during the past 5 years.

We will act strictly as agents for you. We do not stock nor invoice, and work only on an exclusive basis.

We are seeking three more good accounts in the industrial tool field. Our sales record and complete coverage of this highly industrialized territory will impress you. Best references.

**For further information, write Box 99, c/o Modern Machine Shop, 431 Main St., Cincinnati 2, Ohio.**

**Electric Grinders and Buffers.** The Hisey-Wolf Machine Co., Cincinnati 8, Ohio, has released a 36-page catalog (No. 72) which describes and illustrates its line of electric grinders and buffers. Information on combination grinders and buffers, polishers, dust collectors, dust hoods, and eye shields is included.

**Heavy-Duty Vises.** A two-color illustrated bulletin (No. TE2-104) released by The Producto Machine Co., 910 Housatonic Ave., Bridgeport 1, Conn., fully describes its plain and swivel type heavy-duty 6-inch vise. Technical data are included on three models—plain vise with ground sides; plain vise with clamping ears; and swivel vise complete with graduated base.

**Precision Surface Grinders.** Mattison Machine Works, Rockford, Ill., has issued a 22-page circular containing illustrations, descriptions, and specifications of Mattison High-Powered Precision Surface Grinders which include hydraulic feeds and are made in table sizes from 12 x 36 up to 36 x 192 inches and larger.

**"It's Your Future"** is the title of a 36-page booklet published by The Monarch Machine Tool Co., Sidney, Ohio, which is directed to young engineers "fresh out of college." The booklet briefly explains some of the more important facts about the machine tool industry and about Monarch's own organization—its products, progress, and prospects—and how the reader's training might fit into the Monarch picture.

**Special Cutting Tools.** National Tool Co., Cleveland 2, Ohio, has published a 16-page two-color booklet describing the origin and growth of the company, its industrial characteristics, the special attributes of its products and production methods, its financial standing, and its management and staff. The booklet is also designed to make clear the specific and vital function of special cutting tools and to distinguish them from standard cutting tools, machine tools, or hand tools.

**Lathes and Grinders.** An eight-page two-color bulletin (No. 500F) released by Rivett Lathe & Grinder, Inc., Dept. MMS, Brighton 35, Boston, Mass., describes and illustrates the company's complete line of cabinet, hand turret, and toolroom lathes, as well as internal and universal grinders. Specifications for each machine are included.

**Centering Reels.** A four-page two-color bulletin published by F. J. Littell Machine Co., 4163 Ravenswood Ave., Chicago 13, Ill., illustrates and describes a line of extra heavy duty automatic centering reels available in 5, 10, and 20-ton capacities.

**Cemented Carbide Products.** A 68-page illustrated catalog (No. 52) issued by Kennametal, Inc., Latrobe, Pa., provides a complete picture of the variety and range of sizes of carbide products offered by the company. Information on tool blanks, brazed tools, boring tools, Kennamatic and Kendex tools, and Kennamills, as well as hints for ordering, is included.

# where to get it

## — A —

**Abrasive Cloth, Paper, Discs, Belts, Stones, Etc.,** 17, 28, 51, 98, 211  
**Absorbents, Oil and Grease,** 310  
**Air-Operated Equipment** (Look for specific item)  
**Accumulators,** 52, 53  
**Angles,** 238, 375  
**Arbors,** 426, 451

## — B —

**Balancing Machines,** 7, 75  
**Balancing Ways,** 379  
**Bar Machines, Automatic,** 27, 214, 215  
**Bar Stock,** 275  
**Barrels, Tumbling,** 218  
**Bases, Machine,** 209, 294  
**Bases, Magnetic,** 371  
**Bearings, Ball,** 102, 416  
**Bearings, Bronze,** 201, 275  
**Bearings, Oilless,** 201  
**Bearings, Roller,** 102, 416  
**Bearings, Sleeve,** 201, 275  
**Bearings, Thrust,** 102, 201  
**Benchs, Work,** 100, 398  
**Bending Devices,** 357, 360, 367, 420  
**Bending Machines,** 54, 163  
**Bending Rolls,** 96, 365  
**Bins,** 354, 361  
**Bits, Power,** 18  
**Blades, Cutting-Off,** 317  
**Blades, Work Support,** 409  
**Bolts,** 177, 292  
**Boosters,** 52, 53  
**Boring Bars,** 195, 380, 421  
**Boring Bits,** 14, 15  
**Boring, Drilling and Milling Machines, Horizontal,** 47  
**Boring Heads,** 343, 345, 367, 378, 387  
**Boring Machines,** 47  
**Boring and Milling Machines, Vertical,** 11, 339  
**Boring Mills, Horizontal,** 35  
**Boxes, Shop,** 309, 361  
**Brakes, Press and Bending,** 163, 385  
**Broach Kits, Keyway,** 407  
**Broaches,** 42, 43, 93, 269, 271, 407  
**Broaching Fixtures,** 93  
**Broaching Machines,** 8, 9, 42, 43, 93, 271  
**Buffing Machines,** 3, 278, 452  
**Bushings, Drill Jig,** 275, 280, 375, 377, 404

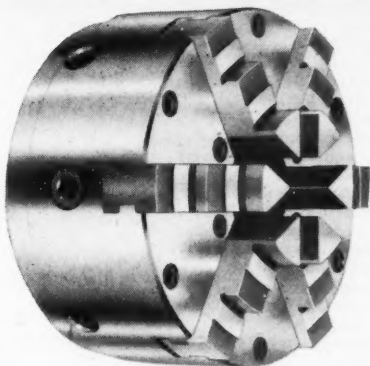
**Bushings, Guide Pin,** 99  
**Bushings, Pilot,** 375  
**Bushings, Sleeve,** 275, 423, 426

## — C —

**Cabinets,** 307, 314, 354  
**Calipers,** 345, 420  
**Cams,** 376  
**Carbides,** 14, 15, 32, 56, 88, 243, 245, 269, 293, 317, 335, 338, 386, 409, 422  
**Center Locaters,** 377  
**Centering Machines, Automatic,** 23  
**Centers, Lathe, Planer, Miller, Etc.,** 262, 265, 326, 341, 402, 405, 418, 426  
**Chasers,** 89  
**Checking Rolls,** 379  
**Chilling Equipment, Industrial,** 213  
**Chisels,** 323  
**Chucking Machines, Automatic,** 27, 214, 215  
**Chucks, Boring,** 222  
**Chucks, Collet,** 426  
**Chucks, Drill,** 16, 87, 272  
**Chucks, Lathe,** 55, 87, 212, 272, 277, 315, 433, 451  
**Chucks, Magnetic,** 277, 315, 325  
**Chucks, Tap,** 18, 87  
**Chucks, Universal,** 315, 357  
**Clamps,** 10, 85, 261, 339, 341, 410, 416  
**Clamps, Air,** 29, 370  
**Clutches,** 224, 316, 321, 337  
**Coil Handling Equipment,** 373  
**Collets,** 64, 87, 265, 426  
**Comparators,** 253  
**Compressors, Air and Gas,** 113  
**Controlling Devices,** 237, 261  
**Coolant Separators,** 19  
**Coolant Units and Systems,** 65  
**Coolants,** 77  
**Counterbores,** 153, 302, 324  
**Couplings, Air,** 261, 337  
**Couplings, Flexible,** 334  
**Cut-Off Machines,** 200, 283  
**Cutter Bodies, Milling,** 247  
**Cutter Sharpening Machines,** 8, 9  
**Cutters, Boring,** 380, 399  
**Cutters, Dovetail,** 311  
**Cutters, Hole,** 375  
**Cutters, Milling,** 32, 56, 153, 156, 157, 281, 293, 399, 427  
**Cylinders, Hydraulic and Pneumatic,** 29, 52, 53, 188, 189, 261, 370, 387, 395



## The UNIVERSAL Chuck with .0005 PRECISION!



### 6 Jaw 6" Chuck Handles Work of 93 Collets!

The capacity of \$1,000 worth of collets for your tool room PLUS scroll chuck rechucking speed on duplicate parts with .0005" precision...

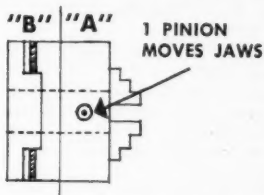
The firm grip of 6 jaws for soft metal or tube work...

An end to most needs for stub arbors, mandrels, or special fixtures...

A reliable precision chuck adaptable to lathes, screw machines, grinders, dividing heads...

The greatest development of recent years to save machinists' time...

That's the brief story of this sensational Adjust-Tru chuck. It is unbelievable—but true! Send for catalog with full details.



#### HOW and WHY it works

Chuck gripping section "A" is like any scroll chuck with one pinion to move jaws. (accurate to .003"). Section "B" shows how chuck "floats" on adapter (.020" clearance) where 4 opposed screws move chuck on adapter for adjustment to dead true precision. Jaws always come back within .0005" on duplicate work.

#### SIZES AVAILABLE:

3- and 6-Jaw Chuck — 4" (light duty);

5", 6", 7½" (heavy duty)

2-Jaw Aviation Chuck — 6", 7½" (heavy duty)

## BUCK TOOL CO.

914 Schippers Lane • Kalamazoo, Mich.

# where to get it

## — A —

**Abrasive Cloth, Paper, Discs, Belts, Stones, Etc.,** 17, 28, 51, 98, 211  
**Absorbents, Oil and Grease,** 310  
**Air-Operated Equipment** (Look for specific item)  
**Accumulators,** 52, 53  
**Angles,** 238, 375  
**Arbors,** 426, 451

## — B —

**Balancing Machines,** 7, 75  
**Balancing Ways,** 379  
**Bar Machines, Automatic,** 27, 214, 215  
**Bar Stock,** 275  
**Barrels, Tumbling,** 218  
**Bases, Machine,** 209, 294  
**Bases, Magnetic,** 371  
**Bearings, Ball,** 102, 416  
**Bearings, Bronze,** 201, 275  
**Bearings, Oilless,** 201  
**Bearings, Roller,** 102, 416  
**Bearings, Sleeve,** 201, 275  
**Bearings, Thrust,** 102, 201  
**Benches, Work,** 100, 398  
**Bending Devices,** 357, 360, 367, 420  
**Bending Machines,** 54, 163  
**Bending Rolls,** 96, 365  
**Bins,** 354, 361  
**Bits, Power,** 18  
**Blades, Cutting-Off,** 317  
**Blades, Work Support,** 409  
**Bolts,** 177, 292  
**Boosters,** 52, 53  
**Boring Bars,** 195, 380, 421  
**Boring Bits,** 14, 15  
**Boring, Drilling and Milling Machines, Horizontal,** 47  
**Boring Heads,** 343, 345, 367, 378, 387  
**Boring Machines,** 47  
**Boring and Milling Machines, Vertical,** 11, 339  
**Boring Mills, Horizontal,** 35  
**Boxes, Shop,** 309, 361  
**Brakes, Press and Bending,** 163, 385  
**Broach Kits, Keyway,** 407  
**Broaches,** 42, 43, 93, 269, 271, 407  
**Broaching Fixtures,** 93  
**Broaching Machines,** 8, 9, 42, 43, 93, 271  
**Buffing Machines,** 3, 278, 452  
**Bushings, Drill Fig.** 275, 280, 375, 377, 404

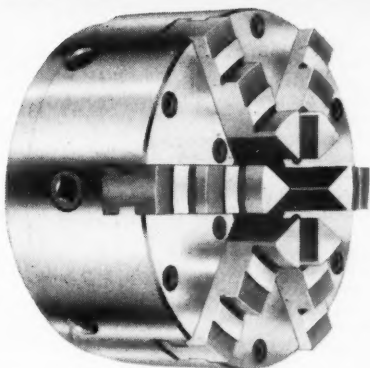
**Bushings, Guide Pin,** 99  
**Bushings, Pilot,** 375  
**Bushings, Sleeve,** 275, 423, 426

## — C —

**Cabinets,** 307, 314, 354  
**Calipers,** 345, 420  
**Cams,** 376  
**Carbides,** 14, 15, 32, 56, 88, 243, 245, 269, 293, 317, 335, 338, 386, 409, 422  
**Center Locators,** 377  
**Centering Machines, Automatic,** 23  
**Centers, Lathes, Planer, Miller, Etc.,** 262, 265, 326, 341, 402, 405, 418, 426  
**Chasers,** 89  
**Checking Rolls,** 379  
**Chilling Equipment, Industrial,** 213  
**Chisels,** 323  
**Chucking Machines, Automatic,** 27, 214, 215  
**Chucks, Boring,** 222  
**Chucks, Collet,** 426  
**Chucks, Drill,** 16, 87, 272  
**Chucks, Lathes,** 55, 87, 212, 272, 277, 315, 433, 451  
**Chucks, Magnetic,** 277, 315, 325  
**Chucks, Tap,** 18, 87  
**Chucks, Universal,** 315, 357  
**Clamps,** 10, 85, 261, 339, 341, 410, 416  
**Clamps, Air,** 29, 370  
**Clutches,** 224, 316, 321, 337  
**Coil Handling Equipment,** 373  
**Collets,** 64, 87, 265, 426  
**Comparators,** 253  
**Compressors, Air and Gas,** 113  
**Controlling Devices,** 237, 261  
**Coolant Separators,** 19  
**Coolant Units and Systems,** 65  
**Coolants,** 77  
**Counterbores,** 153, 302, 324  
**Couplings, Air,** 261, 337  
**Couplings, Flexible,** 334  
**Cut-Off Machines,** 200, 283  
**Cutter Bodies, Milling,** 247  
**Cutter Sharpening Machines,** 8, 9  
**Cutters, Boring,** 380, 399  
**Cutters, Dovetail,** 311  
**Cutters, Hole,** 375  
**Cutters, Milling,** 32, 56, 153, 156, 157, 281, 293, 399, 427  
**Cylinders, Hydraulic and Pneumatic,** 29, 52, 53, 188, 189, 261, 370, 387, 395



## The UNIVERSAL Chuck with .0005 PRECISION!



### 6 Jaw 6" Chuck Handles Work of 93 Collets!

The capacity of \$1,000 worth of collets for your tool room PLUS scroll chuck rechucking speed on duplicate parts with .0005" precision...

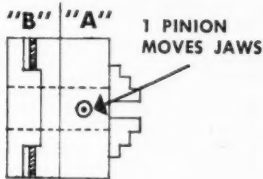
The firm grip of 6 jaws for soft metal or tube work...

An end to most needs for stub arbors, mandrels, or special fixtures...

A reliable precision chuck adaptable to lathes, screw machines, grinders, dividing heads...

The greatest development of recent years to save machinists' time...

That's the brief story of this sensational Adjust-Tru chuck. It is unbelievable—but true! Send for catalog with full details.



#### HOW and WHY it works

Chuck gripping section "A" is like any scroll chuck with one pinion to move jaws. (accurate to .003"). Section "B" shows how chuck "floats" on adapter (.020" clearance) where 4 opposed screws move chuck on adapter for adjustment to dead true precision. Jaws always come back within .0005" on duplicate work.

#### SIZES AVAILABLE:

3- and 6-Jaw Chuck — 4" (light duty);

5", 6", 7½" (heavy duty)

2-Jaw Aviation Chuck — 6", 7½" (heavy duty)

## BUCK TOOL CO.

914 Schippers Lane • Kalamazoo, Mich.

— D —

Demagnetizers, 315, 326  
 Diamond Compounds, 175, 330, 428  
 Diamond Powders, 344, 428  
 Diamond Wheels, 344, 428  
 Diamonds and Diamond Tools, 308, 344, 428  
 Die Heads, Threading, 2  
 Die Making Machines, 44  
 Die Sets, 119  
 Diemakers' Supplies, 99  
 Dies, 4, 94, 95, 99, 214, 215, 225, 288, 410  
 Dividing Heads, 315, 376, 412  
 Drawbars, 265  
 Drawers, Storage, 314, 354  
 Dressing Fixtures, Grinding Wheel, 10, 222, 296, 303, 344, 405  
 Dressing Tools, 344  
 Drifts, 426  
 Drill Heads, 65, 154, 186, 236, 246  
 Drill Rod, 66  
 Drilling Attachments, 55, 280  
 Drilling Machines, Bench, 90, 342, 435  
 Drilling Machines, Horizontal, 191, 273  
 Drilling Machines, Hydraulic, First Cover, 411  
 Drilling Machines, Multiple Spindle, First Cover  
 Drilling Machines, Radial, First Cover, 35, 72, 147, 403  
 Drilling Machines, Vertical, First Cover, 47, 55, 67, 79, 147, 251, 273, 339, 342, 435, 452  
 Drilling, Reaming, and Tapping Machines, Multiple, 24  
 Drilling, Tapping, and Threading Machines, 273, 322  
 Drilling Units, 221  
 Drills, Center, Core, Twist, Square, Etc., 14, 15, 20, 21, 56, 153, 211, 260A, 356  
 Drills, Portable Electric, 45, 441  
 Drills, Portable Pneumatic, 61, 97, 113  
 Drives, Gearshift, 114  
 Dust Control Equipment, 3, 202, 250, 279, 297, 452  
 Dynamometers, 319

— E —

Ejection Sets, Air, 261  
 Embossing Equipment, 121  
 End Mills, 14, 15, 20, 21, 153, 281, 311, 324, 369, 399, 413  
 Engines, Diesel, 113  
 Engraving Machines, 390  
 Etchers, 326, 335

— F —

Facing Heads, 367  
 Feed Fingers, 64  
 Feed Units, 110, 170, 366  
 Feeler Stock, 240  
 Files, 149, 323, 341  
 Files, Band, 306  
 Files, Rotary, 14, 15, 243, 323, 424  
 Filters, 73, 91, 410  
 Fixture Components, 85  
 Flame Hardening Apparatus, 8, 9  
 Flexible Shaft Equipment, 14, 15, 78, 101  
 Floats, 358

Forming Machines, 8, 9

Furnaces, Heat-Treating, 165, 166, 241, 397, 419

— G —

Gage Blocks, 284, 319, 353, 429  
 Gage Handles, 284  
 Gage Plugs, 108, 109  
 Gage Rings, 108, 109  
 Gages, 48, 49, 92, 108, 109, 171, 203, 243, 253, 261, 284, 319, 357, 363, 368, 404, 429, 451  
 Gear Cutting Machines, 184, 185, 318  
 Gears and Gear Units, 5, 382, 414  
 Grinders, Abrasive Band and Disc, 3  
 Grinders, Abrasive Belt, 3, 111, 205, 296  
 Grinders, Air, 61, 97, 210  
 Grinders, Bench, 59, 61, 219, 278, 293  
 Grinders, Centerless, 22  
 Grinders, Chaser, 89  
 Grinders, Chip Breaker, 3  
 Grinders, Crush, 48, 49  
 Grinders, Cutter and Tool, 3, 44, 47, 48, 49, 82, 206, 234, 260  
 Grinders, Cylindrical, 226, 227  
 Grinders, Disc, 211  
 Grinders, Drill, 30, 44, 47, 82, 260, 384  
 Grinders, Face Mill, 44  
 Grinders, Flute, 30  
 Grinders, Internal, Second Cover  
 Grinders, Knife, 417  
 Grinders, Pedestal, 183, 219, 278, 403, 452  
 Grinders, Portable Electric, 441  
 Grinders, Profile, 8, 9, 59  
 Grinders, Radial Relief, 112  
 Grinders, Saw, 206  
 Grinders, Surface, 82, 106, 111, 260  
 Grinders, Tap, 30, 198, 260  
 Grinders, Thread, 344  
 Grinding Fixtures and Attachments, 89, 104, 105, 176  
 Grinding Wheels, 51, 68, 69, 264, 289  
 Guards, Drive, 209  
 Guards, Punch Press, 350  
 Guns, Air, 91, 411

— H —

Hammers, 323  
 Hammers, Portable Pneumatic, 61  
 Hand Tools, Power (Look for specific item)  
 Handles, Hammer, 335  
 Handles, Machine, 341, 344  
 Handwheels, 341, 344  
 Hardness Testing Blocks, 312  
 Hardness Testing Devices, 207, 319  
 Hinges, 248, 355  
 Hob Sharpening Machines, 156, 157  
 Hobbing Machines, 156, 157  
 Hobs, 56, 153, 156, 157  
 Hoisting and Conveying Machinery, 52, 53  
 Holders, Diamond, 303  
 Holders, End Mill, 369  
 Holders, Tap, 351  
 Holders, Tool, 58, 122, 266, 362  
 Holders, Type, 244, 371, 401  
 Holding Fixtures, 388  
 Hones, Diamond, 428  
 Honing Machines, 339, 406, 447



# 18" HEAVY DUTY DRILL PRESS

**With 6 "Bonus" Features  
For Better All-Around  
Heavy Duty Drilling**

- ★  $6\frac{1}{2}$ " Spindle Travel
- ★ 39" Max. Distance Spindle to Table
- ★  $6\frac{3}{64}$ " Spindle—Nose, No. 3 MT
- ★ Head and Table Positioning Mechanism
- ★ Vernier Depth Stop Control
- ★ Ball Bearing Drive

Get these important new drilling advantages with a Clausing 18" Drill Press. The  $6\frac{1}{2}$ " spindle travel gives bigger job capacity, permits better use of production chucks. Drilling capacity:  $\frac{3}{4}$ " in steel, 1" in cast iron. There's 6" to 13" *more* capacity from spindle to table. Spindle is bigger, stronger—handles larger tools. Exclusive vernier control provides .001" depth accuracy. Positioning mechanism saves set-up time—moves *both* head and table. Massive construction, precision-machining throughout, and the smoothness of 5 ball bearing races insure exacting accuracy on every operation. Contact your Clausing distributor, or write for catalog.



Precision Ground 13" x 18"  
Oil Table, 12" x 14" Base

## CLAUSING DIVISION

ATLAS PRESS CO., 9110 North Pitcher Street, Kalamazoo, Mich.

Honing Stones, 447  
Hose Fittings, Air and Welding, 261  
Hose, Industrial, 73  
Hydraulic Equipment (Look for specific item)

— I —

Indexing Bases, 408  
Indexing Fixtures, 318, 388  
Indicators, 155, 253, 304, 318, 319  
Inspection Devices, 48, 49  
Iron Working Machines, 34

— J —

Jig Borers, First Cover, 365  
Jigs and Fixtures, 85, 273, 451  
Joints, Universal, 18, 334

— K —

Keys, Hex, 357  
Keys, Machine, 284, 343  
Keys, Woodruff, 284, 343  
Keys, Socket Screw, 357  
Keyway Cutting Machines, 356  
Knives, Band, 115  
Knobs, Machine, 341, 344  
Knurls, 288

— L —

Lapping Compounds, 175  
Lapping Machines, 226, 227  
Laps, 326  
Lathe Copying Devices, 403, 449  
Lathes, Automatic, 7, 75, 449  
Lathes, Bench, 349  
Lathes, Engine and Toolroom, 12, 13, 55, 76, 181,  
183, 260B, 276, 291, 389, 449, Third Cover  
Lathes, Polishing, 3  
Lathes, Speed, 363  
Lathes, Spinning, 385  
Lathes, Turret, 7, 55, 75, 90, 103, 181, 283, 403  
Lathes, Vertical Turret, 223  
Layout Materials, 292, 378  
Light Wave Measuring Equipment, 429  
Lighting Equipment, 359  
Locating Devices, Multi-Position, 301  
Lubricants, 178, 391  
Lubricators, 73

— M —

Magnifiers, 383, 400  
Mandrels, Expanding, 358  
Markers, Roll, 74, 257  
Markers, Electric, 257  
Marking Machines, 118, 121, 162, 257, 276, 381  
Measuring Wires, 429  
Materials Handling Equipment, 151  
Metallizing Equipment, 187  
Micrometers, 83, 319, 345, 357, 429  
Milling Attachments, 84, 176, 295  
Milling Fixtures, 374  
Milling Machines, Automatic, 8, 9  
Milling Machines, Bench, 196, 379  
Milling Machines, Horizontal, 8, 9, 47, 403  
Milling Machines, Universal, 38, 39, 295  
Milling Machines, Vertical, 199, 394  
Mills, Face, 338  
Molds, Hammer, 335

Motors, 114  
Mounted Points and Wheels, 264, 428  
Mountings, Machine, 235

— N —

Nails, 303  
Nibblers, 61, 337, 364  
Notchers, 163, 259  
Numbering Heads, 401  
Numbering Machines, 118  
Nut Setters, 18  
Nut Setters, Portable Pneumatic, 61  
Nuts, T, 339

— O —

Oils, Cutting, 8, 9, 107  
Oils, Hydraulic, 115  
Ovens, Drying, 286

— P —

Pallets, 309  
Pans, Lathe, 209  
Pans, Tote, 364  
Pantographs, 57  
Parallels, 238, 303, 350, 375  
Parters, Rod, 163  
Pinion Cutting Machines, 318  
Pins, 116, 117, 268, 284, 343, 415  
Pins, Stop, 343, 416  
Planers, 47  
Plates, Angle, 350, 375  
Plates, Cover, 209  
Plates, Lapping, 375  
Plates, Surface, 238, 350, 364, 375  
Plates, Tool and Jig, 327  
Plugs, Pipe, 177  
Plugs, Pressure, 116, 117  
Polishing Machines, 3, 61, 111  
Positioning Machines, Automatic, First Cover  
Power Units, Hydraulic, 255  
Presses, Air, 370  
Presses, Arbor, 197, 387  
Presses, Hand, 410  
Presses, Hydraulic, 70, 197  
Presses, Power, 46, 359, 365  
Presses, Punch, 60, 80, 81, 190, 204, 224, 320, 337  
Presses, Straightening, 379  
Profiling Machines, 390  
Pulleys, 334  
Pumps, Air, 252  
Pumps, Coolant and Lubricant, 445  
Pumps, Hydraulic, 299  
Pumps, Vacuum, 113  
Punch Press Sets, 378  
Punches, 4, 163, 323, 410  
Punching Machines, 96, 365, 372, 381

— R —

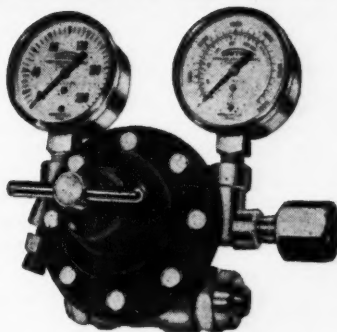
Racks, Bar and Tube, 337  
Racks, Machine, 284  
Racks, Storage Bin, 309, 354  
Rasps, 323  
Reamers, 14, 20, 21, 56, 104, 105, 153, 156, 157,  
211, 229, 245, 256, 268, 324, 386



Here's Why  
Experienced Welders  
*prefer*  
**SMITH**  
BALL BEARING  
**REGULATORS**

**FOR WELDING AND CUTTING:**

1. Smith Regulators give accurate, dependable, trouble-free control of gas pressure.
2. Simplified design with no complicated mechanism . . . no delicate short-lived parts.
3. All parts easily accessible for quick cleaning, adjustment or repair.
4. Low cost maintenance and long years of service.



*A favorite for over 25 years*

**Single Stage or Two Stage . . . SMITH REGULATORS  
are DEPENDABLE and require less maintenance.**

This is precision equipment, based upon years of practical experience in the business and built to give years of service. Best proof of consistent satisfaction is the wide-spread popularity of Smith Regulators from coast to coast. This acceptance has been *earned*—on the job. One thing welders like is the ease of making repairs when necessary. It takes only 10 minutes to change a seat, 15 minutes for a new nozzle and 20 minutes for a diaphragm. No special tools necessary. No long delays. Smith Regulators keep production rolling.

**Smith Welding Equipment Corporation**  
**2633 S. E. 4th, Minneapolis, Minn.      Dept. MMS-42**

Reciprocating Tools, Electric, 419  
 Rectifiers, 237, 315  
 Regulators, 73, 91, 241, 261, 437  
 Rifflers, 424  
 Riveting Machines, 188, 189, 381  
 Rivets, 303  
 Rolling Machines, 163  
 Rolls, Threading, 288  
 Rules, Slide, 428

— S —

Safety Equipment, Press, 298, 350  
 Sandblast Equipment, 252  
 Sanders, Portable Electric, 45  
 Sanders, Portable Pneumatic, 61  
 Saw Blades, Band, 48, 49, 161, 220, 249, 329, 339  
 Saw Blades, Circular, 6, 352  
 Saw Blades, Hack, 33, 155, 161, 329, 339, 340  
 Saw Sharpening Machines, 206, 417  
 Sawing Machines, Band, 48, 49, 249, 274, 306  
 Sawing Machines, Friction, 96  
 Sawing Machines, Hack, 60, 173, 194, 315, 335  
 Saws, Holo, 26  
 Saws, Portable Electric, 45, 313  
 Saws, Portable Pneumatic, 61  
 Scrapers, Hand and Power, 379  
 Screw Drivers, Hand, 18, 369  
 Screw Drivers, Portable Pneumatic, 61  
 Screw Driving Machines, Power, 110  
 Screw Machines, Automatic, 40, 41  
 Screw Machines, Hand, 449  
 Screws, Cap, Set, Socket and Machine, 18, 116, 117, 177, 228, 292, 305, 355, Fourth Cover  
 Screws, Shoulder, 116, 117  
 Screws, Transfer, 302, 375  
 Scribes, Carbide, 419  
 Services: Milling, Grinding, Lapping, Rebuilding, Repairing, Business, Etc., 287, 306, 335, 339, 343, 355, 382, 398, 430, 431  
 Shapers, 50, 55, 60, 63, 71, 145, 181, 403  
 Sharpening Fixtures, 89  
 Shearing Machines, 86, 163, 365  
 Shears, Squaring, 343  
 Shims, 423  
 Sine Bar Fixtures, 328  
 Sine Bars, 328  
 Sleeves, 426  
 Slotting Machines, 47  
 Sockets, 18, 426  
 Solenoids, 214, 215  
 Spacing Collars, Arbor, 423  
 Special Machinery, 7, 75, 271, 294, 339  
 Speed Reducers, 414  
 Spindles, Boring and Tapping, 35, 169  
 Spindles, Grinding, Second Cover, 167  
 Spot Facers, 302  
 Spotters, 379, 426  
 Spring Winders, 356  
 Stampings, Pressed Metal, 360  
 Stamps, 345, 361, 371  
 Steel, General Purpose, 439  
 Steel, Stainless, 439  
 Steel Stock, Ground Flat, 155, 161  
 Steel, Tool, 36, 37, 48, 49, 66, 382, 421, 439  
 Step Block Sets, 339, 378  
 Stops, Die, 426

Stops, Finger, 416  
 Straightedges, 238, 350  
 Straightening Machines, 366  
 Strainers, Air, 261  
 Stud Sets, 339, 378  
 Stud Setters, 18  
 Studs, 292  
 Superfinishing Machines, 7, 75  
 Surface Finish Standards, 30  
 Switches, 214, 215, 237, 315

— T —

Tables, Drill, 263  
 Tables, Rotary and Index, 221, 280, 341, 387  
 Tachometers, 326  
 Tanks, 209  
 Tap Guides, 376  
 Taper Attachments, 296  
 Tapes, Measuring, 155  
 Tapping Attachments, 14, 15, 373  
 Tapping Heads, 65, 273, 351  
 Tapping Machines, 169, 273, 339  
 Tapping Machines, Automatic, 350  
 Tapping Units, 14, 15, 221  
 Taps, 14, 15, 20, 21, 152, 211, 214, 215, 225, 285  
 Taps, Collapsible, 2, 214, 215  
 Thread Checking Machines, 306  
 Thread Rollers, Automatic, 214, 215, 288  
 Threading Attachments, 225  
 Threading Machines, 2, 62  
 Tool Blanks, 32, 428  
 Tool Cribs, 392  
 Tool Posts, Turret, 265, 371, 396  
 Tools, Boring, 58, 88, 179, 247, 335, 343, 371, 383  
 Tools, Bottoming, 88  
 Tools, Carbide, 245, 254, 422  
 Tools, Cutting Off, 266  
 Tools, Facing, 88, 383, 427  
 Tools, Gear Cutting, 56  
 Tools, Honing, 447  
 Tools, Radius, 385  
 Tools, Recessing, 25  
 Tools, Special Cutting, 32, 104, 105, 153, 354, 335, 386  
 Tools, Threading, 88, 308, 383  
 Tools, Turning, 2, 335, 344, 427  
 Transformers, 241  
 Traps, Air, 358  
 Tubing, Tool Steel, 239, 439  
 Tumbling Machines, 218  
 Turrets, Drill, 267  
 Turrets, Lathe, 311, 371, 396  
 Type Sets, Steel, 244, 401

— V —

Valves, 73, 188, 189, 261, 231, 358, 366, 395, 411  
 Vises, Bench and Machine, 10, 31, 91, 315, 332, 335, 337, 341, 359, 361, 369, 370, 419

— W —

Washers, Spring, 387  
 Welding Equipment and Supplies, 233, 437  
 Wrenches, 18, 122, 323, 357  
 Wrenches, Portable Pneumatic, 61, 97

## WAREHOUSE STEEL USERS—

# Our *Personalized Steel Service*

**gives you more value for your dollar**

*Check this list*  
of extra,  
money-saving benefits  
against what you  
are getting from  
your present  
warehouse steel source.

- Your friendly U. S. Steel Supply salesman puts our service team to work for you. Why not let him help you?



**14 warehouses** to draw on—We will conduct nation-wide search for your needs—no *extra* cost.



**Technical assistance**—Our product experts will work “full-time” helping solve your material or production difficulties—no *extra* cost.



**Complete** shearing, cutting and burning service—Our modern equipment enables you to get your steel cut quickly and accurately to your specifications—regular warehouse charges apply.



**A “one-call” source** for all your steel needs—Carbon—Alloy—Stainless—Tubing—Aluminum—Machinery and shop supplies. We stock them all for you—no *extra* charge.



**Personalized Service**—All of our people are trained to treat you right.



### UNITED STATES STEEL SUPPLY DIVISION

#### UNITED STATES STEEL COMPANY

HEADQUARTERS: 208 So. LA SALLE ST., CHICAGO 4, ILL.      WAREHOUSES COAST-TO-COAST  
BALTIMORE • BOSTON • CHICAGO • CLEVELAND • LOS ANGELES • MILWAUKEE • MOLINE, ILL. • NEWARK  
PITTSBURGH • PORTLAND, ORE. • ST. LOUIS • TWIN CITY (ST. PAUL) • SAN FRANCISCO • SEATTLE  
Sales Offices: INDIANAPOLIS • KANSAS CITY, MO. • PHILADELPHIA • PHOENIX  
ROCKFORD, ILL. • SALT LAKE CITY • SOUTH BEND • TOLEDO • TULSA • YOUNGSTOWN

**UNITED STATES STEEL**



## the last word

---

### It Takes Many to Build But Few to Destroy

**T**HIS month in thousands of communities across the nation a special effort will be made to inform the people in each locality that America has reached a position of world leadership in the preservation of world peace through the unimpaired genius of the American people. In searching for ideas which would adequately express this theme, we came across an item in the New England Letter published by the First National Bank of Boston. The item is called "The Retreat From Freedom Must Be Stopped." This excellent appraisal of what we must do to maintain this position of world leadership, now that we have attained it, is presented herewith.

The basic task before the American people is to establish bulwarks against further Government encroachment upon individual freedom. Unless current trends are checked, the American system, as we have known it, will be destroyed. It is ironical that, while we battle for survival against Communism, many of our domestic policies are based upon totalitarian principles. To proclaim and champion abroad the virtues of democracy and private enterprise is of no avail if at home we adopt measures and policies that have all the earmarks of totalitarianism with its regimentation and submergence of the individual.

The greatest menace to our freedom is the paternalistic spirit of our Government that endeavors to extend its sheltering

arms about the people in order to protect them from the hazards of life, and at the same time to guarantee them an abundant life. With the advance of society and the growing complexity of our economic system, there naturally follows an extension of Government services such as schools, roads, health, and the protection of life and property. But Government activities, particularly in the past two decades, have been extended far beyond the essential services and involve in their many ramifications not only the invasion of private enterprise but also the taking over of many functions that should be the primary concern of the individual or the family.

The planners are under the impression that if they were in the driver's seat, by some hocus-pocus the lot of the common man would materially improve overnight, inequalities and social injustices would disappear, and the entire country would work together as a big happy family under a planned economy. But there are no short cuts to Utopia. As a matter of fact, under a planned economy, personal initiative would be replaced by a bloated and sprawling bureaucracy which would issue innumerable directives and impose red tape and regulations that would strangle enterprise, devour our substance, trample our liberties under foot and pauperize our people.

Government planning did not originate with the New Deal. It is antediluvian as its roots run back thousands of years and it reached full bloom in the Middle Ages.

**SPEEDS UP OPERATIONS IN TOOL ROOMS  
... ON PRODUCTION LINES**

# **DREMEL** *Electric* **MOTO-TOOLS**



**DOES THESE  
OPERATIONS  
BETTER—FASTER:**

**GRINDING  
DRILLING  
BURRING  
POLISHING  
DRESSING  
SHARPENING  
ENGRAVING  
FINISHING**

**WRITE  
FOR  
INDUSTRIAL  
CATALOG**

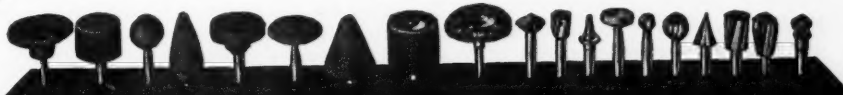
**MOTO-TOOL KIT NO. 2** contains 23 accessories, including **high-speed steel** cutters and Model 2 Moto-Tool in natural finish hardwood case ..... **\$23.50**  
**MOTO-TOOL NO. 2**, with one emery wheel point ..... **\$16.50**

Dremel **HIGH-SPEED STEEL CUTTERS** and balanced wheel points are available for all makes of hand grinding tools. Write for literature.

**APPROX.  
27,000  
R.P.M.**

## **"The Pocket-Size Machine Shop"**

Dremel Moto-Tools are time tested—have been widely used in industry for over fifteen years. A veteran of World War II, Moto-Tool served in war plants and at military maintenance bases throughout the world. Thousands of these mighty mid-gets helped to make the atomic bomb—were used to establish production records in defense industries during the last war. Hundreds of toolroom and production line operations, such as polishing and grinding dies, burring parts, marking tools, sharpening cutters, touch up jobs, etc. are accomplished in seconds, *without tearing down "set-ups."* Moto-Tool is sturdily constructed for long lasting industrial service. Weighs only 13 oz.—dynamically balanced for vibrationless operation.



**DREMEL MFG. CO.** Dept. 222-J **RACINE, WIS. U.S.A.**

## the last word, (continued)

The cornerstone of medieval society was unchanging tradition. Rules and regulations covered many thousands of pages while minute specifications were provided on how things were to be made and how crops were to be grown and harvested. All work was done in the same manner year after year, generation after generation. This system has been referred to as "planless compulsion." It eventually degenerated into confusion and anarchy as widespread corruption and fraud undermined the iron-clad regulations. Since the rigidity of the system made impossible any adaptation to new developments, it finally disintegrated.

Prior to the second World War, the Fascist countries held out to their people a Utopian plan of full employment, better homes, and security. But after surrendering their freedom for an illusory security and military pageantry, the Italian and German people were led into a war of aggression that ended in humiliating defeat and widespread misery. Socialism has reduced Great Britain to a state of poverty and weakness.

The American people are entitled to any kind of system they may choose to elect. But it is inconceivable that they would knowingly approve one that will inevitably destroy individual freedom and make them mere puppets of the state, as has happened in every country where a paternalistic government has dominated the lives of the people. It is wishful thinking to say that "it cannot happen here."

A planned system under government direction and control, such as Socialism, is parasitic as it distributes the fruits acquired under private enterprise. Whenever a government has endeavored to provide on an extensive scale for its people, it has done so by using up past reserves, followed by confiscatory taxation. This is clearly demonstrated in Great Britain. The accumulated British wealth has been dissipated, and now, according to their own officials, any further extension of social

services must be paid for by the recipients. With the heavy shrinkage of the income of wealthy Britons, an increasing proportion of the tax burden is being carried by those in the lower-income groups. Whereas in 1938 only about 20 per cent of total personal income taxes were contributed by those in the income classes below 1,000 pounds a year, the proportion has sharply increased to over 40 per cent.

Let us grimly face the cold facts relating to the dangerous trends in our own country. For the past decade or so, we have been prosperous because of the staggering outlay of public funds. Since 1939, Federal expenditures have aggregated more than \$650 billion. Of this amount, about \$310 billion has been spent since the end of World War II. Federal expenditures for this fiscal year are estimated at \$85 billion, while outlays by state and local governments will be around \$25 billion. Total government expenditures—Federal, state, and local—are equivalent to about 78 per cent of the wages and salaries of all persons engaged in gainful non-government pursuits. Taxes of all kinds absorb about one third of national income. No nation can for long stagger under such a load. As a matter of fact, the day of reckoning is here and the American people must pay the piper since the days of "easy plucking" are over. Soaking the rich is no longer a fruitful source of new taxes as the levies on this group are now so high that any further substantial increase would result in diminishing revenue. If every cent of income after taxes of those receiving \$25,000 a year and over were confiscated by the Government, the aggregate amount would be sufficient to pay Federal current bills for only about ten days.

Notwithstanding all evidence to the contrary, a large proportion of the American people apparently believe that the Government has a magic source of income. This is an illusion. The Government's primary source of income is tax revenue.

Total Federal revenue paid by the people in all the states equals the aggregate amount of income of the United States Treasury except during deficit periods. Whenever the Government spends more than it collects in terms of revenue, this is reflected in a corresponding increase in the Federal debt. This is a mortgage on future income, and therefore represents deferred tax collections. Since there is no Santa Claus, the people must pay the bills from their own pocketbooks. The more the Government takes of the people's money, therefore, the less they have left to spend according to their own discretion. It should be realized that, when the Government spends the money, a big bite is taken out of every dollar to pay the bureaucrats who carry out the programs. Furthermore, the heavy tax burden is making it increasingly difficult for the American people to provide for their own security, and this in turn compels them to rely upon Government aid, and thus there is created a vicious circle.

While the slogans "soaking the rich" and "sharing the wealth" may have their political appeal, historical evidence clearly shows that any arbitrary system of leveling down income threatens the living standards of all as it squashes the pyramid and distributes poverty. The people of Great Britain are finding this out.

Down through the ages, freedom has been lost through default because of ignorance and the harboring of illusions among the people. General Dwight D. Eisenhower has warned: "... it is not enough merely to realize how freedom has been won. Essential also is it that we be ever alert to all threats to that freedom. Easy to recognize is the threat from without. Easy too is it to see the threat of those who advocate its destruction from within. Less easy is it to see the dangers that arise from our own failure to analyze and understand the implications of various economic, social, and political movements among ourselves."

The American people are being duped by sugar-coated slogans, honeyed words,

and false promises as well as bribed by their own money to sell their heritage for "a mess of pottage." Unless an awakening soon takes place, the precious heritage of freedom can slip through our grasp as has happened in other countries that pursued a course similar to our own. We should soberly heed the warning of the old maxim, "Eternal vigilance is the price of liberty."

### **Motion and Time Study Films**

The Bureau of Audio-Visual Instruction of the State University of Iowa has released a revised edition of two of its most important sound films; namely, "Motion Study Principles" and "Motion Study Applications." Each film has been entirely retaken and the new prints are now available on a rental or sales basis by the State University of Iowa, Bureau of Audio-Visual Instruction, Iowa City, Iowa.

"Motion Study Principles" is 990 feet long and has a showing time of 28 minutes. The purpose of this sound film is to present some of the most important principles of motion economy and to illustrate how these principles may be applied to specific operations.

"Motion Study Applications" is 660 feet in length and has a showing time of 18 minutes. This film defines the most common hand motions and shows how an understanding of this classification of motions, together with a knowledge of motion study principles, enables one to develop better and easier ways to work.

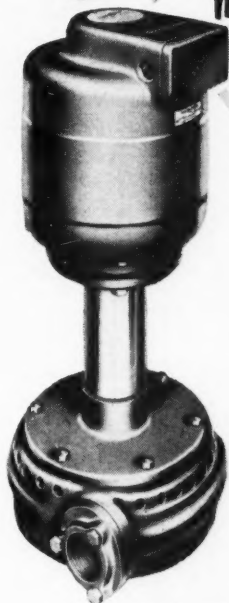
For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.

# index to advertisements

Ace Drill Bushing Co. ....	280	Barnes Drill Co. ....	191
Acme Industrial Co. ....	377	Bartelt Engr. Co. ....	357
Acme Tool Co. ....	375	Bausch & Lomb Optical Co. ....	396
Acme Wire & Iron Works ....	392	Bellows Co. ....	29
Acromark Co. ....	381	Benchmark Mfg. Co. ....	190
Aget-Detroit Co. ....	202, 250	Besley-Welles Corp. ....	211
Air-Mite ....	387	Bicknell-Thomas Co. ....	302
Airway Pump & Equipment Co. ....	411	Black Diamond Saw & Machine Works, Inc. ....	384
Albertson & Co., Inc. ....	219	Blake Co., Edward ....	30
Alina Corp. ....	429	Bliss Co., E. W. ....	365
Allegheny Ludlum Steel Corp. ....	94, 95	Bloomfield Tool Corp. ....	343
Allen Mfg. Co. ....	228	Boggis & Co., H. P. ....	198
Alpha Corp. ....	178	Bokum Tool Co. ....	58
Aluminum Co. of America ....	327	Boyar-Schultz Corp. ....	59
American Air Filter Co. ....	297	Boye & Emmes Machine Tool Co. ....	291
American Broach & Machine Co. ....	271	Bradford Machine Tool Co. ....	183
American Chain & Cable Co., Inc. ....	200	Bremil Mfg. Co. ....	343
American Machine & Foundry Co. ....	31	Brewster-Squires Co. ....	335
American Non-Gran Bronze Co. ....	430	Brighton Screw & Mfg. Co. ....	177
American Saw & Mfg. Co. ....	161	Brown Corp., W. R. ....	91
American Standard Co. ....	405	Brown Engr. Co. ....	337
American Tool Works Co. ....	169	Brown & Sharpe Mfg. Co. ....	40, 41
Ames Co., B. C. ....	253	Bryant Chucking Grinder Co. ....	203
Anderson Bros. Mfg. Co. ....	379	Buck Tool Co. ....	433
Apex Machine & Tool Co. ....	18	Buckeye Brass & Mfg. Co. ....	275
Apex Tool & Cutter Co. ....	399	Buckeye Tools Corp. ....	97
Armstrong-Blum Mfg. Co. ....	26	Buffalo Forge Co. ....	34
Armstrong Bros. Tool Co. ....	122	Bullard Co. ....	223
Arter Grinding Machine Co. ....	106	Bultool Co. ....	402
Art-Mil Machine & Mfg. Co. ....	377	Burke Machine Tool Co. ....	196
Atlantic Gear Works ....	382	Busch Co., J. C. ....	238
Atlantic Saw Mfg. Co. ....	220		
Atlas Press Co. ....	63, 435	Cadillac Stamp Co. ....	257
Austin Industrial Corp. ....	295	Campbell Div., Andrew C. ....	200
Auto Moulding & Mfg. Co. ....	255	Carlton Machine Tool Co. ....	72
Automatic Methods, Inc. ....	373	Carroll Dividing Head Co. ....	376
Avey Drilling Machine Co. ....	221	Carroll & Jamieson Machine Tool Co. ....	276
		Carson-Newton Co. ....	341
Babcock & Wilcox Co. ....	239	Challenge Mehry. Co. ....	109
Barber-Colman Co. ....	156, 157	Chandler Tool Co. ....	367
Bardons & Oliver, Inc. ....	283	Chicago Mfg. & Distributing Co. ....	391
Barker Engr. Co. ....	379	Chicago Pneumatic Tool Co. ....	113
Barnes Co., Inc., W. O. ....	340	Chicago Quadrill Co. ....	246



"They last for  
the life of the  
machine"



## **RUTHMAN GUSHER COOLANT PUMPS**

Ask any machine-tool manufacturer who uses Ruthman Gusher Pumps on their machines, they'll tell you that Gusher Pumps are efficient, dependable, and remarkably trouble-free . . . a credit to the metal working machines on which they are installed. So specify Ruthman Gusher Pumps on all your metal working equipment.

**THE RUTHMAN MACHINERY CO.**



1817 READING ROAD

•

CINCINNATI 2, OHIO

Chicago Tool & Engr. Co.	359
Chicago Wheel & Mfg. Co.	264
Cincinnati Bickford Tool Co.	147
Cincinnati Electrical Tool Co.	452
Cincinnati Gilbert Machine Tool Co.	35
Cincinnati Lathe & Tool Co.	367
Cincinnati Milling Machine Co.	8, 9
Cincinnati Milling Machine Co., Cincinnati Milling Products Div.	77
Cincinnati Milling Machine Co., Grinding Wheels Div.	68, 69
Cincinnati Shaper Co.	145
Clark Co., Robert H.	375
Clark Instrument, Inc.	312
Cleveland Crane & Engr. Co.	86
Cleveland Twist Drill Co.	260-a
Clipper Diamond Tool Co., Inc.	344
Collins Microflat Co.	364
Collis Co.	426
Columbia Tool Steel Co.	382
Comet Tool Co.	353
Commander Mfg. Co.	65
Commercial Centerless Grinding Co.	398
Consolidated Machine Tool Corp.	47
Cook, Inc., L. H.	235
Covel Mfg. Co.	82
Craley Mfg. Co., C. C.	387
Criterion Machine Works	345
Cross & Son, Herbert	405
Crucible Steel Co. of America	36, 37
Cunningham Co., M. E.	371
Dahlstrom Mfg. Co.	376
Dake Engine Co.	197
Danly Machine Specialties, Inc.	119
Davis Boring Tool Div.	58
Giddings & Lewis Machine Tool Co.	356
Davis Keyseater Co.	356
Defiance Machine & Tool Co.	162
Delta-Rockwell Power Tool Div.	342
Despatch Oven Co.	286
Detroit Boring Bar Co.	380
Detroit Broach Co.	42, 43
Detroit Power Screwdriver Co.	110
Detroit Reamer & Tool Co.	104, 105
Detroit Stamping Co.	240
DeVlieg Microbore Co.	195
Diamond Tool Research Co., Inc.	428
Disston & Sons, Inc., Henry	6
Diversified Metal Products Co.	22
DoAll Co.	48, 49
Donovan Mfg. Co.	419
Dries & Krump Mfg. Co.	285
Dremel Mfg. Co.	441
duMont Corp.	407
Dykem Co.	292
Eastern Centerless Grinding Co.	430
Economy Machine Products Co.	355
Economy Tool & Machine Co.	464
Edroy Products Co.	383
Eisler Engr. Co.	339
Eklind Tool & Mfg. Co.	357
Electro-Matic Products Co.	237
Elgin National Watch Co.	230

Elmwood Mfg. Co.	387
Empire Tool Co.	317
Enco Mfg. Co.	359, 371
Ettee Tool Co., Inc.	16
Ex-Cell-O Corp.	255
F & M Sales, Inc.	387
Falls Products, Inc.	341
Famco Machine Co.	46
Farrel-Birmingham Co., Inc.	5
Federal Products Corp.	32
Fellows Gear Shaper Co.	184, 185
Felters Co., Inc.	235
Field & Son, Inc., Walter W.	374
Flynn Mfg. Co.	378
Footo-Burt Co.	79
Fosdick Machine Tool Co.	First Cover
Foutk Mfg. Co.	430
Freyman Co., J. E.	421
Fulfo Specialties Co., Inc.	331
Fuller Tool Co.	254
Fulmer Co., C. Allen	447
G & H Mfg. Co.	318
Gallmeyer & Livingston Co.	260
Gammons-Hoagland Co.	268
Gardner Machine Co.	17
Gateco Rotary Bushing Co.	375
Gemco Shaper Co.	71
General Mfg. Co.	359
General Pattern Works	430
Gerotor May Corp.	299
Gillen Co., John	415
Gisholt Machine Co.	7, 75
Gorton Machine Co., George	57
Grand Tool & Supply Co.	423
Grant Mfg. & Machine Co.	381
Gray Machine Co.	364
Greaves Machine Tool Co.	430
Greenfield Tap & Die Corp.	225
Grob Bros.	306
Grobet File Co. of America	424
Guthery Machine Tool Corp.	449
Halpern & Co., Inc., Wm.	373
Hamilton Tool Co.	151
Hammond Mehry. Builders, Inc.	3
Hanchett Mfg. Co.	417
Handy Products Co.	307
Hanna Engr. Works	188, 189
Hartford Steel Ball Co.	218
Haskins Co., R. G.	78
Hassall, Inc., John	305
Heald Machine Co.	Second Cover
Heimann Mfg. Co.	302
Heller Bros. Co.	323
Hendley & Whittemore Co.	365
Hexl Duty Electric Co.	241
Hi-Duty Drill Works	356
Hilliard Corp.	316
Himoff Machine Co., Inc.	335
Hjorth Lathe & Tool Co.	356
Holo-Krome Screw Corp.	Fourth Cover
Hossfeld Mfg. Co.	367
Housson Grinding & Mfg. Co., Inc.	262

**CUT AWAY  
METAL FROM  
INTERNAL  
CYLINDERS  
"MOSTEST  
AND  
FASTEST"  
WITH  
FULMER  
HONING  
MACHINES**

**FREE**

Get copy of  
manual:

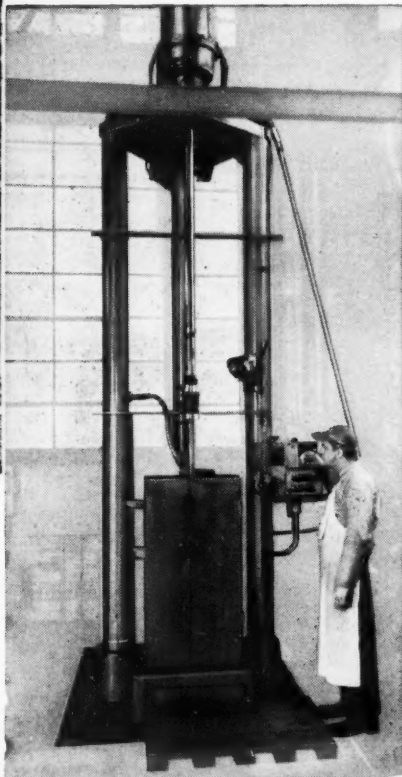
**"WHAT TO  
KNOW  
ABOUT  
HONING"**

**ACCURACY**

self-aligning hones remove rough spots of the internal surface and then hone the cylinder to tolerances up to .0001" ( $\pm$ ) on ferrous, non-ferrous metals, plastics and glass.

**SPEED**

exact, uniform, constant, removes up to 1/16" from diameter at 1 1/2 to 2 cu. in. per min.



Fulmer supplies  
"everything  
in one  
package":  
Honing  
Machine . . .  
Hones . . .  
Stones . . .  
Fixtures . . .  
Tools.

*Photo taken in  
plant of The  
Frank G. Hough  
Co., Libertyville,  
Illinois, world's  
largest tractor-  
shovel manufac-  
turer.*

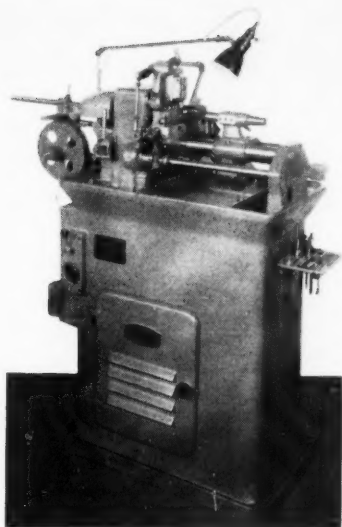
**C. ALLEN FULMER CO.**

1233 First National Bank Bldg.

Cincinnati 2, Ohio

Howe & Fant, Inc.	267
Huot Mfg. Co.	314
Huppert Co., K. H.	397
Huron Machine Products	284
Hutchinson Co., Wm. T.	428
Hy-Pro Tool Co.	285
Ideal Industries, Inc.	326
Ideal Tool Co.	304
Independent Pneumatic Tool Co.	61
Ingersoll Milling Machine Co.	247
J & S Tool Co., Inc.	10
Jacobs Mfg. Co.	87
Jarvis Co., Chas. L.	14, 15
Johansson Co., I. O.	394
Johansson Gage Co., C. E.	319
Johnson Bronze Co.	201
Johnson & Son, Inc., S. C.	107
Jones & Lamson Machine Co.	89
Junkin Safety Appliance Co.	298
Kalamazoo Tank & Silo Co.	333
Kaufman Mfg. Co.	350
Kearney & Trecker Corp.	199
Kelly Mfg. Co., Robt. J.	416
Kelvin Systems Corp.	403
Kennametal, Inc.	32
Kirk & Blum Mfg. Co.	209
Kling Bros. Engr. Works	96
Knight Mehry, Co., W. B.	11
Koebel Diamond Tool Co.	308
L & J Press Corp.	224
L-W Chuck Co.	315
Lamina Dies & Tools, Inc.	99
Laminated Shim Co., Inc.	360
Landis Machine Co.	2
Lapointe Machine Tool Co.	93
Last Word Sales Co.	222
Lavallee & Ide, Inc.	229
LeBlond Machine Tool Co., R. K.	12, 13
Lee Engr. Co.	322
Lees-Bradner Co.	62
Lehmann Machine Co.	260-b
Leiman Bros., Inc.	252
Leslie Welding Co.	410
Levin & Son, Inc., Louis	90
Lewthwaite Machine Co., T. H.	357
Lima Electric Motor Co.	114
Lincoln Electric Co.	233
Lincoln Park Industries, Inc.	243
Linley Bros. Co.	365
Lipe-Rollway Corp.	313
Littell Machine Co., F. J.	366
Littleford Bros., Inc.	294
Lockheed Aircraft Corp.	355
Lodge & Shipley Co.	Third Cover
Logan Engr. Co.	181
Lovejoy Flexible Coupling Co.	334
Lucas & Son, Inc., J. L.	364
Luers, J. Milton	266
Lynn Mfg. Co.	396

Madison-Kipp Corp.	210
Magic City Machine & Tool Co.	303
Marvin Machine Products, Inc.	412
Master-Taper Co.	296
Mattison Machine Works	111
Maxwell Co.	343
Mead Specialties Co.	370
Mechanical Development Corp.	418
Metallizing Engr. Co., Inc.	187
Michigan Chrome & Chemical Co.	378
Michigan Drill Head Co.	186
Miller-Knuth Mfg. Co.	194
Miller Motor Co.	52, 53
Minnesota Mining & Mfg. Co.	98
Modern Machine Tool Co.	263
Moline Tool Co.	339
Montgomery & Co., Inc.	306
Morey Mehry, Co., Inc.	389
Morris Machine Tool Co.	24
Morse Twist Drill & Machine Co.	20, 21
Morton Machine Works	85
Motch & Merryweather Mehry, Co.	352
Murphy & Co., Inc., Jas. A.	410
National Acme Co.	214, 215
National Machine Tool Co.	332
National Twist Drill & Tool Co.	153
Neerup Industrial Equipment	416
Neise, Karl A.	361, 371
Nelco Tool Co., Inc.	338
New Hermes, Inc.	390
New Method Steel Stamps, Inc.	361
Newcomer Products	422
Niagara Machine & Tool Works	80, 81
Nicholson & Co., W. H.	358
Nicholson File Co.	149
Nielson Tool & Die Co.	375
Noble & Westbrook Mfg. Co.	74
Norgren Co., Inc., C. A.	73
Norma-Hoffman Bearings Corp.	102
North Bros. Mfg. Co.	369
North West Tool Co.	335
Northwestern Tool & Engr. Co.	378
Norton Co.	31, 226, 227
Numeral Stamp & Tool Co.	401
O.K. Tool Co.	293
Ohio Gear Co.	414
Oliver Instrument Co.	44
Oliver Machinery Co.	385
O'Neill-Irwin Mfg. Co.	163
Ottomiller Co., Wm. H.	292
Palmer-Shile Co.	309
Pannier Corp.	121
Parker Stamp Works, Inc.	244
Pathon Mfg. Co.	395
Pedrick Tool & Machine Co.	54
Penn Scientific Products Co.	175
Pittsburgh Stamp Co., Inc.	345
Pope Mehry, Corp.	167
Portage Double Quick Tool Co.	179
Porter-Cable Machine Co.	205
Porter Machine Co.	430
Precise Products Co.	176



## AUTOMATICS

19/32" - 13/16" - 1" - 1-13/32"

- VERSATILE
- HIGH SPEED
- PRECISION
- ECONOMICAL • PROVEN

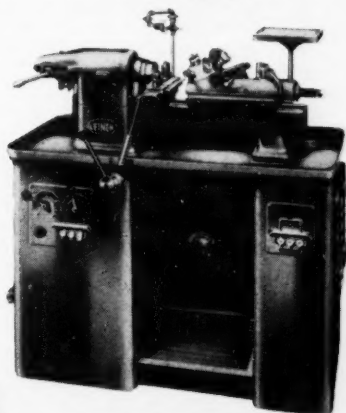
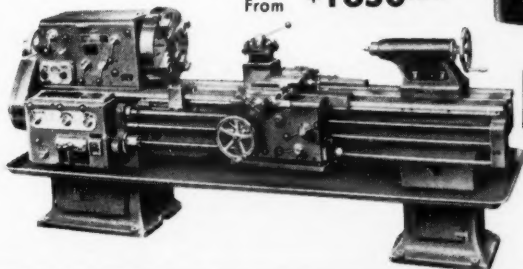
PRICES FROM **\$2475.00**



- HAND SCREW MACHINES • SCREW CUTTING LATHES
- PLAIN LATHES

*Unrivalled for Accuracy*

Prices From **\$1650.00**



**WEISSER HEILBRONN**

HIGH SPEED LATHES  
18 1/2" To 28 1/4" Swing  
Hydraulic Copying  
Attachments

EXCLUSIVE U. S. DISTRIBUTORS  
SERVICE • PARTS

**GUTHERY MACHINE TOOL CORPORATION**

130 W. 42ND STREET

NEW YORK 36, N. Y.

Precision Welder & Flexopress Corp.	204
Procon Safety Chuck Co.	351
Prosser & Son, Thomas	393
Queen City Machine Tool Co.	278, 301
Racine Hydraulics & Mehry, Inc.	173
Rahn Granite Surface Plate Co.	350
Rands Co.	428
Reading Machine Co.	350
Reed Rolled Thread Die Co.	288
Reid Tool Supply Co.	341
Reltool Corp.	369
Richards Co., J. A.	360
Rimat Tool Co.	363
Rivett Lathe & Grinder, Inc.	103
Robbins Co., Omer E.	328
Roberts Rubber Co., Weldon	51
Rocheleau Tool & Die Co.	234
Rockford Clutch Div.	321
Rockford Machine Tool Co.	50
Royal Oak Tool & Machine Co.	112
Royal Products Co.	265
Rusnok Tool Works	84
Ruthman Mehry, Co.	445
S. C. & L. Machine Co.	419
S & S Hinge & Metal Products Co.	248
Sales Service Machine Tool Co.	60
Savage Co., W. J.	337
Schauer Mfg. Corp.	363
Scherr Co., Inc., George	345
Schlecht & Son, L. G.	376
Schmidt, Inc., Geo. T.	118, 276
Schrader's Son, A.	261
Scully-Jones & Co.	25
Scully Machine Co.	368
Seneca Falls Machine Co.	23
Sentry Co.	165
Service Machine Co.	320
Services Directory	430, 431
Severance Tool Industries, Inc.	287
Sheldon Machine Co., Inc.	349
Shell Oil Co., Inc.	115
Shore Woodwork Co.	398
Sibley Machine & Foundry Corp.	251
Sid Tool Co., Inc.	311
Sidney Machine Tool Co.	76
Simonds Abrasive Co.	289
Simonds Saw & Steel Co.	33
Simonski Co., Gilbert S.	166
Skilsaw, Inc.	45
Skinner Chuck Co.	277
Smith Welding Equipment Corp.	437
Snow Mfg. Co.	273
Solar Steel Corp.	66
Somerset Tool Co.	296
South Bend Lathe Works	55
Speedgrip Chuck	212
Stackbin Corp.	354
Standard Gage Co., Inc.	171
Standard Horse Nail Corp.	343
Standard Machine & Tool Co., Ltd.	411
Standard Pressed Steel Co.	116, 117
Standard Steel Specialty Co.	284
Staples Tool Co.	386

Starrett Co., The L. S.	155
Stearns Magnetic, Inc.	19
Sterling Factory Equipment Co.	361
Sub-Zero Products	213
Sundstrand Machine Tool Co.	408
Sundstrand Magnetic Products Co.	325
Super Tool Co.	245
Superior Hone Corp.	406
Superior Indicator Co.	318
Sutton Tool Co.	64
Syntron Co.	170
Taft-Pelce Mfg. Co.	108, 109
Tal Bender, Inc.	420
Tamms Industries, Inc.	310
Tannewitz Works	249
Teeter, C. B.	385, 410
Thermo Electric Mfg. Co.	419
Thomas Hoist Co.	272
Thompson & Son Co., Henry G.	339
Thriftmaster Products Corp.	236
Tietzmann Tool Corp.	339
Tomco Products Co.	344
Tomkins-Johnson Co.	281
Torit Mfg. Co.	279
Troyke Mfg. Co.	280
Tubular Micrometer Co.	83
Twentieth Century Mfg. Co.	256, 416
Union Twist Drill Co.	56
U. S. Industrial Tools	306
U. S. Steel Supply Co.	439
Universal Engr. Co.	362
Van Keuren Co.	429
Van Norman Co.	38, 39
Victor Mehry, Exchange, Inc.	413
Victor Saw Works	329
Viking Tool Co.	427
Vogel Tool & Die Corp.	259
Walls Sales Corp.	296
Waltham Machine Works	318
Wardwell Mfg. Co.	206
Warner & Swasey Co.	27
Watts Bros. Tool Works	382
Webber Gage Co.	353
Weldon Tool Co.	324
Wells Mfg. Corp.	274
Wesson Co. & Affiliates	269
West Tool & Die Corp., R. C.	426
Whistler & Sons, Inc., S. B.	4
White Dental Mfg. Co., S. S.	101
Whitney Mfg. Co., W. A.	381
Whitney Metal Tool Co.	372
Whiton Machine Co.	357
Wiley's Carbide Tool Co.	409
Wilson, K. R.	70
Wilson Mechanical Instrument Co.	207
Winter Bros. Co., W. A.	152
Wisconsin Drill Head Co.	154
Woodworth Co., N. A.	451
Zagar Tool, Inc.	388
Zeh & Hahemann Co.	337

..... in the  
 "JET PROGRAM"—its **WOODWORTH**  
**FOR PRECISION CHUCKING**

**No. 2** IN A SERIES

DATE		PART NAME		PART NO. 220151	
BY	DATE	OPER. NAME	GRIND ID & FACE TRUE WITH O.D.	MACHINE	SPEED NO. 120
TOOLS AND GAUGES		DESCRIPTION OF OPERATION AND SWITCH		INT GRINDER	FEED
WOODWORTH 3 1/2 INCH DIAPHRAGM CHUCK		32.901 DIA. 32.899		257 250	
30.869 DIA. 30.870		LOCATION		STOP	

**NOTE:**  
 I.D. & O.D. MUST BE CONCENTRIC  
 WITHIN .0008 TIR & SQUARE  
 WITH FACES WITHIN .0005 PER INCH

The aircraft, automotive and associated fields recognize Woodworth as "headquarters" for the best precision chucking. So for the best solution to your precision chucking problems... send part print and machining information to Woodworth.



*Accuracy you can trust*

**WOODWORTH**

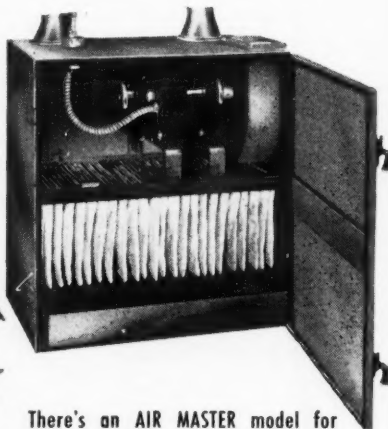
N. A. WOODWORTH CO., 1300 EAST NINE MILE ROAD • DETROIT 20, MICHIGAN  
 PRECISION GAGES • DIAPHRAGM CHUCKS AND ARBORS • CONE-LOK JIGS

# AIR MASTER Says to Harmful Grit!



Grit is the enemy of costly machines, and of manpower, too. Put a stop to this menace with the AIR MASTER.

Trapped as they leave the wheel of your grinder or buffer, flying particles are filtered out by fabric and steel wool bags. Only grit-free air is discharged. AIR MASTER is self-contained, ruggedly built for long years of trouble-free service.



There's an AIR MASTER model for every grinder and buffer. Give your plant this protection NOW!

**Write today!** Ask for name of your distributor or Bulletin 52-YA.

THE BEST IN  
DRILLS,  
GRINDERS,  
BUFFERS,  
PORTABLE TOOLS



TRADE

*The Cincinnati*

MARK

## THE CINCINNATI ELECTRICAL TOOL CO.

Division of THE R. K. LeBLOND MACHINE TOOL CO.

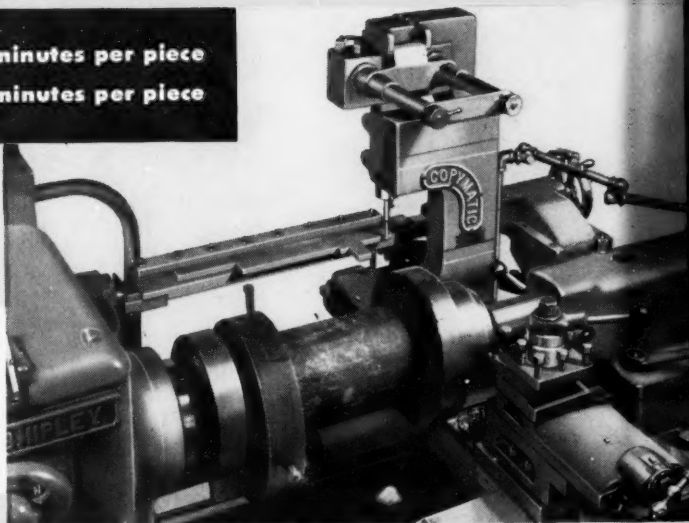
C I N C I N N A T I 8, O H I O

# COPYMATIC USER REPORTS \$14,000 ANNUAL SAVINGS

## MACHINING TIME ON ONE JOB CUT 85%

... from 522 minutes per piece  
to just 82 minutes per piece

Turning the 500 lb. Prutton "Rollmaster" spindle. Due to the size and weight of the part, a lat template is used in contour turning before grinding.



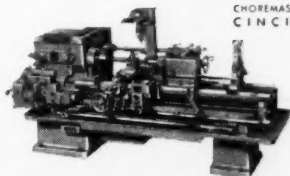
Think of the savings when you cut almost seven and a half hours from a job that took a little more than eight and a half hours by previous methods! That's the astonishing record of a Lodge & Shipley COPYMATIC Lathe in service at the D. H. Prutton Machinery Co., Cleveland. The estimated annual savings are enough to amortize the machine in just one year!

In the production of the 500 pound spindle used in the revolutionary Prutton "Rollmaster" Planetary Thread Rolling Machine, machining time used to be 8 hours, 42 minutes. On the COPYMATIC, it's only 1 hour, 22 minutes. The operation is contour turning before grinding; the spindle is SAE 4140 steel; carbide tools are used at 240 feet/minute and .021"/rev. feed.

In commenting on the COPYMATIC's performance, Mr. D. H. Prutton stated that the machine "is set up in 20 minutes, out-produces regular lathes four to five times and has excellent design features." This 536% increase in production indicates the advantages COPYMATIC offers practically any shop. If you'd like more details . . . write for Bulletin No. 675 and other case histories.

THE **Lodge & Shipley**  
COMPANY

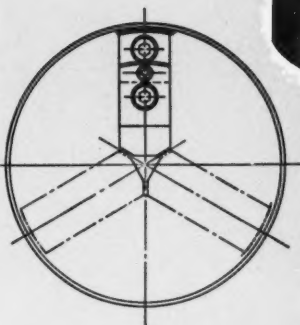
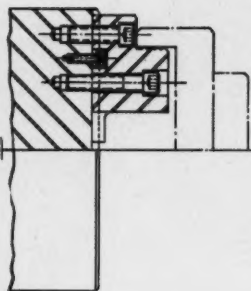
MACHINE TOOL DIVISION • 8058 COLUMBIA  
CHROME-MASTER DIVISION • 800 EVANS ST.  
CINCINNATI 25, OHIO



# **SPECIFY HOLO-KROME**

the BETTER fastening method.

## **CAP SCREWS**



Socket Head  
CAP SCREW

### **H-K INTERNAL WRENCHING**



*Guaranteed Unfailing Performance*

**CALL** YOUR H-K AUTHORIZED  
INDUSTRIAL DISTRIBUTOR *TODAY*

D7



# **HOLO-KROME**

*Completely Cold Forged*

## **SOCKET SCREWS**

THE HOLO-KROME SCREW CORP., HARTFORD 10, CONN. U. S. A.